STATE OF NEW YORK

DEPARTMENT OF CONSERVATION

WATER RESOURCES COMMISSION

The Ground-Water Resources of Sullivan County, New York

By

JULIAN SOREN

Geologist, U. S. Geological Survey

Prepared by the

U. S. GEOLOGICAL SURVEY

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NEW YORK STATE WATER RESOURCES COMMISSION

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THE GROUND-WATER RESOURCES OF SULLIVAN COUNTY, NEW YORK

By

Julian Soren

ABSTRACT

Sullivan County comprises an area of 986 square miles in the southeastern part of New York. A pleasant summer climate, scenic topography, and proximity to the large population of the metropolitan area of New York City have made the county a popular summer vacation area. As a result, the temporary population during the summer months is often nearly 13 times greater than the permanent population.

Ground water is the principal source of water supply in the county, providing approximately 90 percent of water needs in the summer and 75 percent in the winter. The balance of the water requirements is provided from surface-water sources. Most of the ground water used is obtained from individually owned wells and springs rather than from public-supply systems.

Sullivan County is underlain by sedimentary rocks ranging in age from Middle Ordovician to Late Devonian. The bedrock dips generally northwest and is covered in most places by unconsolidated stratified drift and till of Pleistocene age. Most of the ground water used in Sullivan County is obtained from the Upper Devonian rocks and from Pleistocene deposits of stratified drift. The other geologic units are either too deeply buried to be readily accessible to wells, have poor yields, or contain undesirable constituents such as hydrogen sulfide. Yields of individual wells range from less than 1 gpm (gallons per minute) in till to as much as 700 gpm from coarse outwash. Wells in bedrock have intermediate yields reported to be as much as 120 gpm. Much ground water is discharged naturally to the land surface as springs, many of which are utilized as sources of supply. Yields of springs of as much as 30 gpm have been reported.

Water from the Upper Devonian rocks and Pleistocene deposits generally is soft, is slightly acidic, and contains moderate to high amounts of iron. Excessive hardness and objectionable amounts of hydrogen sulfide have been reported for water from the shales of Middle Ordovician age. The average annual temperature of the ground water is 51°F.

It does not appear that the ground-water resources of the county are being depleted. Moreover, the aquifers probably could be subjected to considerably greater exploitation, particularly the thick deposits of unconsolidated sand and gravel in the larger valleys.

INTRODUCTION

Purpose and Scope of Investigation

The study of the ground-water resources of Sullivan County is part of a general investigation of the ground-water resources in New York which is being made by the U. S. Geological Survey in cooperation with the New York Water Resources Commission. Ground water is the principal source of supply for the expanding needs of many homes, farms, resorts, businesses, and villages in the county. The purpose of this report is to assemble and evaluate readily available information on the source, occurrence, availability, and chemical quality of the ground water as an aid in the development and utilization of this vital natural resource and to provide a basis for further studies, if needed. An index map (fig. 1) shows the location of Sullivan County and the other counties or areas in New York, exclusive of Long Island, where similar studies have been or are being conducted. A list

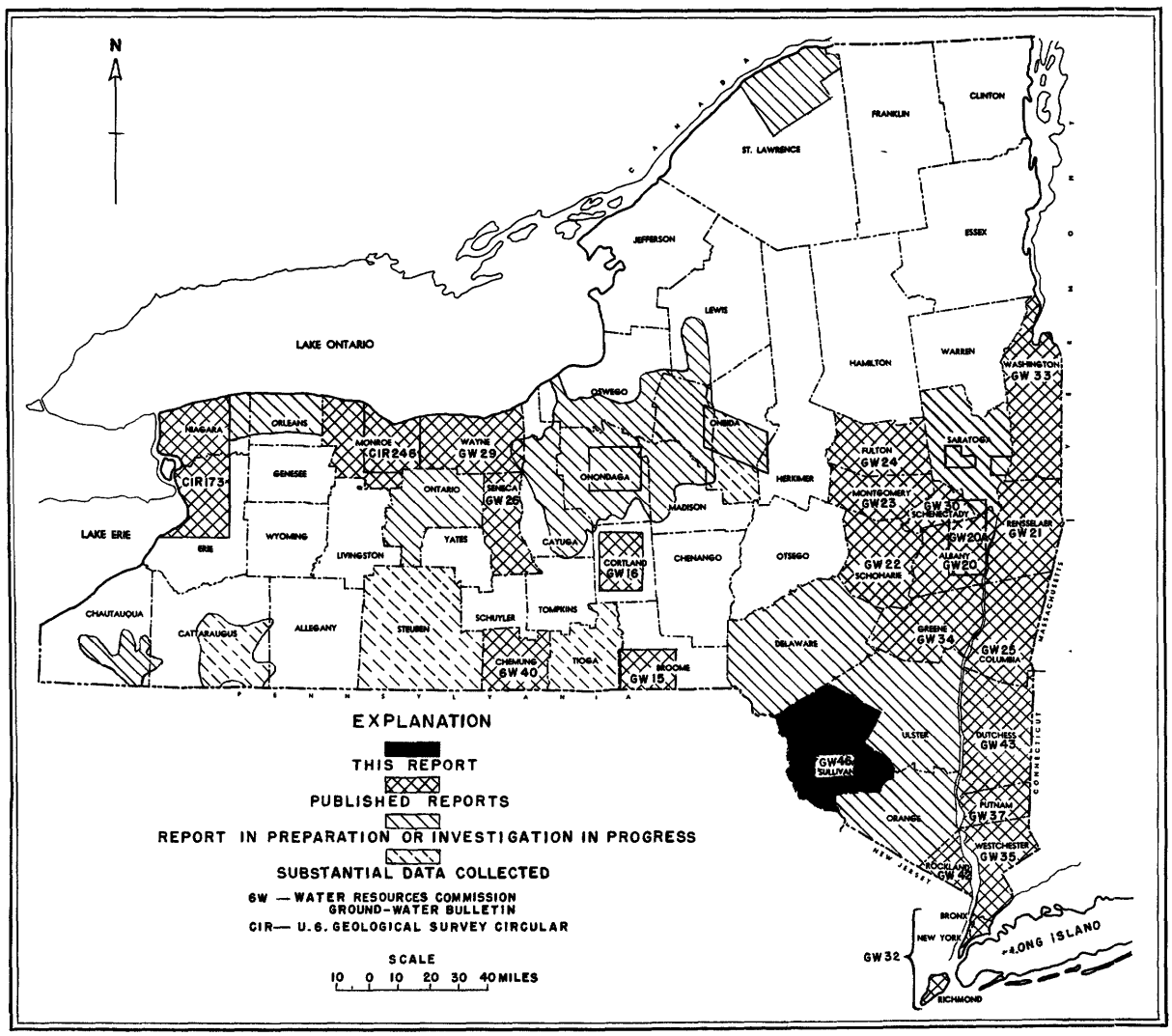

Figure 1.--Map of New York, exclusive of Long Island, showing location of Sullivan County and status of ground-water investigations.

of the published reports is given on the back cover of this report. This report was prepared under the direct supervision of Ralph C. Heath, and under the general supervision of George C. Taylor, Jr.

Methods of Investigation

The study in Sullivan County was part of a general investigation of the geology and hydrology of the Delaware River basin. Data for the New York State portion of the Delaware basin were collected and compiled by personnel of the U. S. Geological Survey, Ground Water Branch, Mineola, N. Y., under the direction of Nathaniel M. Perlmutter, project geologist. Most of the information on the occurrence and availability of ground water in the county is based on records of more than 600 wells, springs, and test borings collected in 1956 and 1957. The wells, test borings, and springs were numbered consecutively in the order visited, starting with Sv 1 for wells and test borings and Sv 1Sp for springs (the letters "Sv" designating Sullivan County). The locations of the wells, test borings, and springs are shown in plate 1. Most of the well and spring data given in tables 6 and 7 were supplied from memory by the owners. Well logs shown in table 8 are based on written records of the well drillers.

The sections on geology in this report are based principally on reconnaissance field mapping of unconsolidated deposits and bedrock by the author during the latter part of 1957, and on a study of published and unpublished reports and well records.

Chemical analyses of water from wells in selected areas of the county were made by the U. S. Geological Survey, Quality of Water Branch, Albany, N. Y., and by the New York State Department of Health. These analyses are shown in table 4.

Well-Location System

The locations of wells, test borings, and springs listed in tables 6 and 7 of this report are shown in plate 1. As an aid in locating these features on maps of New York, meridians of longitude have been lettered consecutively from west to east at intervals of 15 minutes beginning with "A", for long 79°45' W., and ending with "Z", for long 73°30' W. Similarly, parallels of latitude have been numbered at 15-minute intervals from north to south beginning with "1" for lat 45°00' N. and ending with "17" for lat 41°00' N. Sullivan County lies between meridians "S" (long 75°15' W.) and "W" (long 74°15' W.) and between parallels "13" (lat 42°00' N.) and "16" (lat 41°15' N.). The grid system made by the intersections of the lines of latitude and longitude is shown in plate 1. Each well, test boring, and spring listed in tables 6 and 7 has a set of location coordinates which give its distance in miles and direction from a specific intersection of the gridlines. For example, well Sv 1 which has location coordinates 15V, 4.7N, 0.9E is located 4.7 miles north and 0.9 mile east of the intersection of gridlines "15" and "V"; in like manner, well Sv 10, with location coordinates 14V, 8.7S, 4.7W, is located 8.7 miles south and 4.7 miles west of the intersection of gridlines "14" and "V". All the wells, test borings, and springs shown in tables 6 and 7 can be located on

plate 1 in this manner from the location coordinates given for them in the tables.

Previous Reports and Investigations

The geology of Sullivan County is described briefly in the report by Mather (1843) on the First Geologic District of New York. The generalized distribution of the bedrock units are shown on the geologic map of New York State (Merrill, 1901). The soils of the county are described in a report by Secor and others (1946). The Pleistocene geology of small areas in the vicinity of Grahamsville and Phillipsport is described by Rich (1935). Ingham (1940), Gray (1953), and Sims and Holtz (1951) describe the lead-zinc mines (now abandoned) and stratigraphy of Shawangunk (pronounced Shôn'-gum) Mountain in Sullivan County and vicinity. Fluhr (1953) describes some of the geologic features of the county and gives cross sections based on test borings at sites proposed for construction of dams and tunnels for the New York City Board of Water Supply. Ground-water conditions in the part of the county in the Delaware River basin have been described in an administrative report prepared by N. M. Perlmutter and E. Salvas as part of an overall report on the Delaware River basin (1957, written communication).

Acknowledgments

The author gratefully acknowledges the assistance and cooperation of the many well drillers, business firms, property owners, and public officials who provided most of the well and spring data used in this report. Lawrence V. Rickard, senior paleontologist of the Geological Survey, New York State Museum and Science Service, gave freely of his time and knowledge in discussing aspects of the stratigraphy of the county with the author.

GEOGRAPHY

Location and Extent of Area

Sullivan County comprises an area of 986 square miles in the southeastern part of New York, lying approximately between longitude 74°20' and 75°10' W. and latitude 41°25' and 42°05' N. The county occupies parts of the Andes, Damascus, Ellenville, Livingston Manor, Long Eddy, Margaretville, Milford, Monticello, Neversink, Port Jervis, Slide Mountain, and White Lake 15-minute topographic quadrangles of the U. S. Geological Survey. Sullivan County is bounded on the north by the counties of Delaware and Ulster, on the east by the counties of Ulster and Orange, on the south by the county of Orange and the Commonwealth of Pennsylvania, and on the west by the Commonwealth of Pennsylvania.

Population

According to the New York State Department of Commerce (1954, p. 2), the population of Sullivan County in 1950 was 40,731 and in 1953 was 42,193. In 1950, the village of Liberty had the largest population, a total of 4,658, and Monticello, the county seat, was second in size with a population of 4,223.

The occupational distribution of the population in 1950 was as follows: agriculture, 14.5 percent; construction work, 16.0 percent; manufacturing, 6.4 percent; hotel operation, 12.4 percent; miscellaneous services and industries, 16.2 percent; and retail and wholesale trade 34.5 percent (New York State Department of Commerce, 1954, p. 6-7).

A combination of climatic conditions, scenic beauty, and proximity to New York City and its metropolitan environs makes Sullivan County a popular summer-resort area. It is difficult to estimate the summer population of the county because it is highly variable. At times, the summer population is estimated to average nearly 13 times the permanent population. The increase in population is made up chiefly of summer-home dwellers and a greatly varying number of vacationers in the many hotels, bungalow colonies, and other vacation and holiday facilities, some of which are in operation all year. Many sportsmen utilize the area for hunting and fishing. Public fishing streams are well stocked and small game and deer are abundant. The number of visitors during a calendar year, most of whom come in the summer, has been estimated at 603,000 (Written communication, Homer A. Millard, director, Sullivan County Publicity and Development Committee, June 30, 1958).

Climate

The climate of Sullivan County is humid continental and is characterized by long, cold winters and short, warm summers. The mean summer temperature is about 65° F, and the mean winter temperature is about 23° F. Temperatures as high as 99° F are not uncommon and the lowest temperature ever recorded in the county was -34° F (Secor and others, 1946, p. 7). The growing season ranges from about 120 days in the northern part of the county to about 165 days in the southern part (Mordoff, 1949, p. 21), generally lasting from the middle of April to the early part of October.

The average annual precipitation in the county is about 46 inches. Precipitation records are being collected at 12 sites in the county, and unbroken records have been collected since 1941 at 7 of these sites. No significant long-term differences in precipitation are observable from place to place. A graph showing the monthly maximum, average, and minimum precipitation at the village of Neversink is shown in figure 2. As may be seen from the figure, the average monthly precipitation is distributed relatively evenly over the year.

Topography and Drainage

Topography

The surface of Sullivan County consists of steep hills and narrow valleys. The topography of the county can be differentiated into major physiographic units known as the Appalachian Plateau and the Ridge and Valley province; the Appalachian Plateau can be further subdivided into the Catskill section, also known as the Catskill Mountains, and the Southern New York section (Fenneman, 1938, p. 195-212 and 310-323).

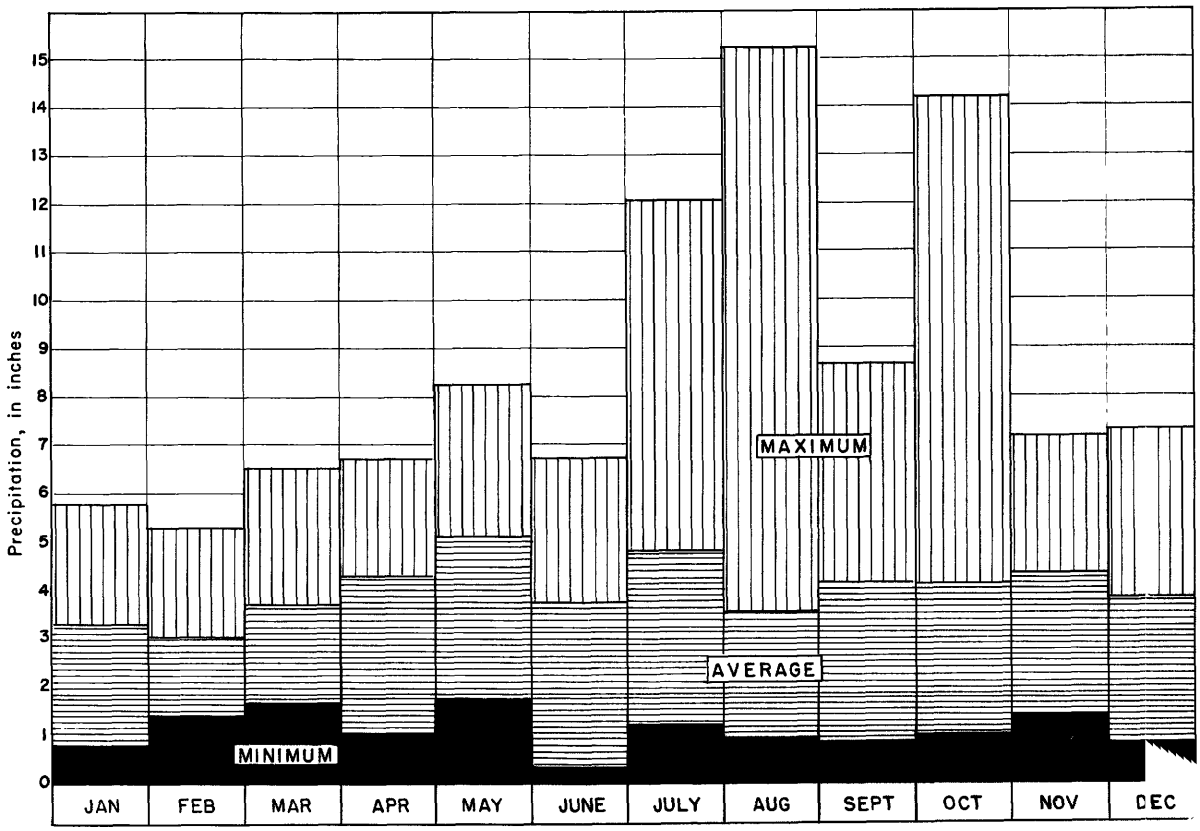

Figure 2.--Monthly maximum, average, and minimum precipitation at Neversink, N. Y. (Based on records from 1941 through 1958 on file in the office of the U. S. Weather Bureau, Albany, N. Y.)

The locations of these topographic subdivisions are shown in figure 3. The highest point in the county is Denman Mountain, altitude 3,051 feet, in the Catskill section; the lowest point is in the Ridge and Valley province, at the junction of the Shawangunk and Platte Kills, on the eastern border of the county, at an altitude of approximately 380 feet. The overall maximum relief of the county is about 2,671 feet.

Appalachian Plateau

Catskill section.--The Catskill section (fig. 3) lies generally north of a line extending across the county about 2 miles south of the villages of Grahamsville and Livingston Manor. The most rugged topography and highest altitudes in the county are in this area where hilltops are generally more than 2,000 feet above sea level. Denman Mountain, 3,051 feet in altitude (fig. 3), about 4 miles north of the village of Grahamsville, is the highest point in Sullivan County. The lowest altitude in the Catskill section is along the shoreline of the Rondout Reservoir and is about 820 feet in altitude. Thus the maximum relief in this part of the county is about 2,231 feet. Hillsides are steep, divides are narrow, and most of the valleys are deep and V-shaped. Flood plains are generally less than half a mile wide and generally are present only along the major tributary streams.

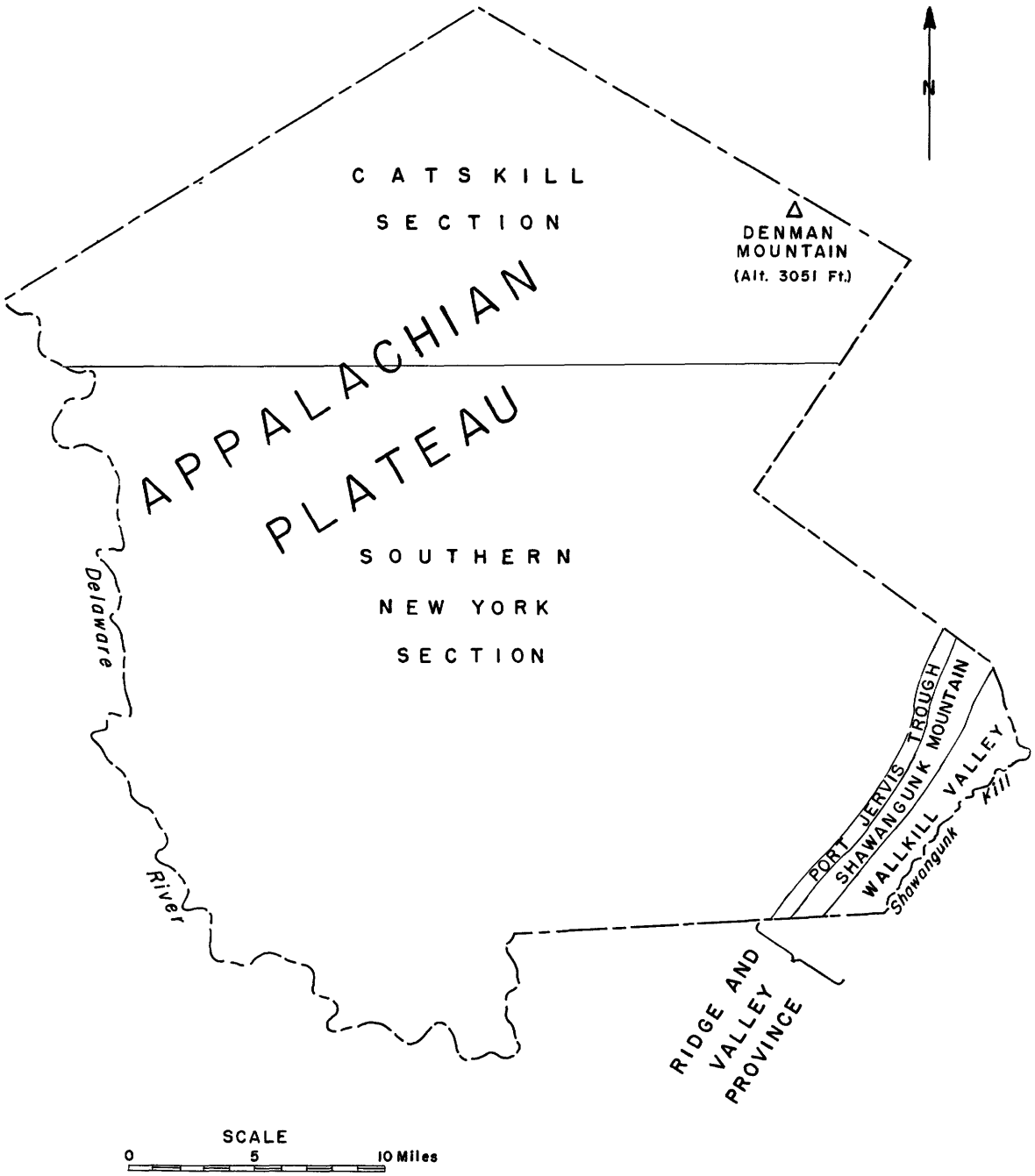

Figure 3.--Topographic divisions of Sullivan County, N. Y. (after Fenneman, 1938).

The Catskill Mountains were formed by the dissection of a plateau underlain by rocks which dip gently to the northwest. The highest hilltops are underlain by a siliceous conglomerate which greatly resists erosion. The lower hilltops are maintained by sandstones; valleys are developed along the strike of weaker siltstones and shales and in zones of fracture.

Southern New York section.--The Southern New York section (fig. 3) is the largest topographic subdivision in Sullivan County, lying south of the Catskill Mountains and bounded near the southeastern border of the county by a relatively steep southeastward-facing dissected escarpment. The altitudes of the hilltops in this area range from about 2,000 feet in the northern part to about 1,200 feet in the southern part. The lowest point in this area, about 480 feet in altitude, is at the junction of the Delaware and Mongaup Rivers on the southern boundary of the county. Thus, the maximum relief in this area is approximately 1,500 feet. The slopes of the hillsides are gentler and divides are broader than those of the Catskill Mountains to the north. The valleys of the Southern New York section are not generally as deeply incised as those of the Catskill Mountains. Flood plains are common along the smaller as well as the larger streams and range in width from less than 100 feet to as much as 0.5 mile. Deep gorges in parts of the courses of the Delaware, Mongaup, and Neversink Rivers are believed to have been developed in belts of rock weakened by faults and joints, or both.

The siliceous conglomerates which underlie the higher hilltops of the Catskill Mountains are absent in the Southern New York section. As in the Catskill Mountains, the Southern New York section is underlain by rocks that generally dip gently to the northwest.

Ridge and Valley province

The Ridge and Valley province lies east of the Appalachian Plateau and occupies about one-tenth of the area of the county (fig. 3). The most striking topographic feature in this area is Shawangunk Mountain, a typical sharp-crested hogback flanked on the west by the Port Jervis Trough (Fenneman, 1938, p. 204) and on the east by the broad, rolling Wallkill valley (Fenneman, 1938, p. 209-210). Shawangunk Mountain trends northeast and its fairly even crest ranges in altitude from about 1,800 feet at its northern limit in the county to about 1,350 feet in the south. The lowest point in Sullivan County, altitude about 380 feet, is in the Wallkill valley at the junction of the Platte and Shawangunk Kills, at the easternmost tip of the county. The maximum relief in the Ridge and Valley province is about 1,400 feet. The Port Jervis Trough is a flat-bottomed valley about one mile wide throughout most of its extent in the county, trending parallel to Shawangunk Mountain. The floor of the trough decreases in altitude southward from about 560 feet near Ulster County to about 500 feet at the Orange County line. Very little of Sullivan County is occupied by the Wallkill valley because the east flank of Shawangunk Mountain extends nearly to the Shawangunk Kill, which is the eastern boundary of the county.

Shawangunk Mountain is underlain by strongly cemented conglomeratic rocks which maintain the ridge. The Port Jervis Trough, underlain by shale, siltstone, and limestone, and the Wallkill valley, underlain by shale, have been formed by the more rapid erosion of these weaker rocks. Differential erosion of strongly tilted rocks has produced the strike-oriented, parallel ridges and valleys.

Drainage

Most of Sullivan County is drained by the Delaware River and its tributaries. Major tributaries of the Delaware are: the Beaver Kill and Willowemoc Creek, which drain the north-central part of the county; Callicoon Creek and the Tenmile River, which drain the west-central part; the Mongaup River, which drains the south-central area; and the Neversink River, which drains most of the eastern part. The remainder of the eastern part of the county is drained by Sandburg Creek and the Shawangunk Kill, which are tributaries of streams emptying into the Hudson River, about 20 miles to the east.

In many parts of the county, particularly in the Southern New York section, surface drainage is poor and there are numerous lakes and swamps. The poor drainage results from widespread deposition of glacial drift in drainage courses by a continental glacier which invaded the area from the north in Pleistocene time. (See the following sections on Stratigraphy and Geologic History.) Prominent evidence of glacial damming, deposition, and disturbance of drainage is observable in the Port Jervis Trough from the vicinity of Summitville to the Ulster County line. In this area a thick deposit of sand and gravel appears to have been laid down, at least in part, by ancestral Sandburg Creek probably as a result of ice or morainal damming in the valley. Fluhr (1953, p. 140-142) estimates that the bedrock floor of the Port Jervis Trough is nearly at sea level at the village of Phillipsport, and shows the bedrock of the valley at the village of Godeffroy, in Orange County about 5 miles south of Sullivan County, to be at an altitude of about 300 feet above sea level. Thus it appears that the preglacial stream which occupied the Port Jervis Trough flowed northeast toward the Hudson River. The present Basher Kill flows southwest into the Neversink River on unconsolidated glacial deposits which slope southwest from Summitville to the Delaware River, at Port Jervis in Orange County. Some of the lakes in Sullivan County probably were formed in valleys whose mouths had been dammed by glacial drift, transforming them into basins without outlets.

The U. S. Geological Survey, in cooperation with the New York State Department of Public Works, and other agencies, measures stream flow at many gaging stations throughout New York. Table 1 contains a summary of streamflow measurements made in Sullivan County.

Table 1.--Records of stream discharge at gaging stations in Sullivan County

(Measurements by the Surface Water Branch, U. S. Geological Survey)

Stream	Location of gaging station	Length of record	Drainage area above station (sq. mi.)	Average discharge [a] (cfs/sq.mi.)	Maximum discharge at station [a]		Minimum discharge at station [a]	
					Date	cfs	Date	cfs
Beaver Kill	at Craigie Clair	1937-Present	82	2.52	9/27/42	10,300	8/28/49	8.4
Callicoon Creek	at Callicoon	1940-Present	111	1.67	9/17/47	16,000	9/11-12/44	5.4
Chestnut Creek	above Red Brook at Grahamsville	1937-1938	12.2	--	7/22/38	2,600	Several times during period	6
Chestnut Creek	at Grahamsville	1938-Present	20.9	1.94	10/15/55	4,640	9/12/49	2.0
Delaware River	near Barryville	1940-Present	2,023	[b]	8/19/55	[b] 130,000	9/ 5/53	122
Little Beaver Kill	near Livingston Manor	1924-Present	19.8	2.33	8/26/28	3,420	8/1,3,5/36	1.0
Mongaup River	near Mongaup	1939-Present	202	1.72	8/19/55	[b] 12,300	10/ 1/39	[b] 6
Neversink River	at Claryville	1949-1951	61.1	--	11/25/50	22,000	8/27-29/49	13
Neversink River	near Claryville	1951-Present	65.6	3.14	7/10/52	10,200	9/ 1- 2/53	9.4
Neversink River	at Halls Mills, near Curry	1937-1949	68	2.79	7/22/38	12,400	9/21/46	14
Neversink River	at Neversink	1941-Present	91.9	[b]	11/25/50	22,300	9/22-24/54 10/26-29/54	[b] No flow
Neversink River	at Oakland Valley	1928-Present	222	[b]	8/19/55	[b] 23,800	9/28-30/41, 10/1/41 8/28/49, 10/12/53	30
Neversink River	at Woodbourne	1937-Present	113	[b]	11/26/50	22,000	6/27/53	[b] 6.7
Rondout Creek	near Lowes Corners	1937-Present	38.5	2.62	7/22/38	7,600	9/ 4/53	4.8
Tenmile River	at Tusten	1946-Present	45	1.63	8/19/55	6,850	10/20-21,22,24/53	1.5
Willowemoc Creek	at Debruce	1948-1952	40.9	--	3/30/51	9,480	10/ 5/48	7.3
Willowemoc Creek	near Livingston Manor	1937-Present	63	2.44	3/31/51	10,500	9/22/41, 9/4-5/53	10

[a] Through September 30, 1956.

[b] Affected by reservoir storage and/or diversion.

GEOLOGY

Stratigraphy

Sullivan County is underlain by consolidated sedimentary rocks (bedrock) ranging in age from Middle Ordovician to Late Devonian. (See table 2.) These rocks are generally mantled by unconsolidated stratified and unstratified deposits of Quaternary age. Figure 4 shows the distribution of the principal bedrock units and plate 2 shows the distribution of the unconsolidated deposits. The bedrock strata are progressively younger in age from the eastern border of the county westward. Middle Ordovician rocks crop out from the eastern edge of the county to the east flank of Shawangunk Mountain. The crest and west flank of Shawangunk Mountain are underlain by Silurian rocks. Lower to Middle Devonian strata underlie the Port Jervis Trough beneath a thick cover of stratified Quaternary deposits and extend to the base of the Catskill escarpment. Rocks of Late Devonian age form the Catskill escarpment and underlie the remainder of the county west of the escarpment.

Ordovician System

Hudson River formation of former usage

The rock strata of the Hudson River formation, a name no longer used by the U. S. Geological Survey, in Sullivan County consist of medium-to dark-gray marine shale with intercalated thin beds and lenses of light-gray siltstone and sandstone. The rocks are slightly calcareous at many places, and fractures in them are commonly filled with secondary calcite deposits.

The rocks in this unit may be equivalent to the rocks referred to as the Snake Hill formation and the Normanskill shale in the Albany area (L. V. Rickard, written communication, 1958). However, as these rocks have not been studied in detail in Sullivan County they are referred to in this report as the Hudson River formation. Approximately 1,000 feet of these strata are exposed in Sullivan County. The formation is overlain by rocks of Silurian age.

Wells and springs tapping the Hudson River formation generally yield sufficient quantities of water for domestic and farm use, but the water in many areas contains hydrogen sulfide (H_2S) and probably is moderately hard to hard because of calcium and magnesium compounds disseminated throughout the strata.

Silurian System

Silurian rocks, undifferentiated

Rocks of Silurian age form the crest and western slopes of Shawangunk Mountain and underlie the eastern margin of the Port Jervis Trough, comprising a thickness of approximately 1,400 feet. The uppermost beds of the Silurian rocks are overlain with apparent conformity by the basal beds of Lower Devonian strata. The Silurian rocks have been subdivided in areas to the north and south of Sullivan County into, in ascending order, Shawangunk conglomerate, High Falls shale, Binnewater sandstone, (Grabau, 1906, p. 124),

Table 2.--Summary of the stratigraphy and water-bearing properties of the geologic formations in Sullivan County

Class	System	Series	Geologic formation or unit	Thickness a/	Character of material	Water-bearing properties
Unconsolidated deposits	Quaternary	Recent	Alluvium	As much as 10± feet; generally less than 5 feet.	Stratified silt, sand, and gravel in stream channels and floodplains.	Unimportant aquifer because of small extent and thinness of deposits. Moderate yields may be obtained from wells in coarse-grained deposits hydraulically connected with streams or lakes.
		Pleistocene	Outwash (stratified drift)	Maximum of 680 feet estimated. Thicknesses between 75 and 100 feet are not uncommon.	Stratified drift and interbedded fine to coarse sand and gravel. Locally beds of clay are present. Material is thickest in major stream valleys.	Generally an excellent aquifer. Properly constructed wells are capable of high yields. Individual wells in outwash may yield from a few gallons to several hundred gallons of water per minute depending on the pump and well construction. Moderate amounts of iron occur in water from some wells drawing from these deposits. Water is generally soft.
			Lacustrine deposits	Not known.	Generally stratified beds of clay, silt, and fine sand.	Sandy deposits with adequate recharge probably would yield small quantities of water.
			Till (unstratified drift)	As much as 450 feet known.	Unstratified mixture of clay, silt, sand, gravel, cobbles, and boulders in greatly varying proportions; clay is generally predominant. Usually called "hardpan" or "boulder clay" by drillers. Covers most of county.	Poor aquifer, generally, because of low permeability. Yields sufficient water for domestic use to large-diameter dug wells. Springs often noted at contact between till and underlying bedrock. Water is generally soft.
			Unconformity			
Consolidated rocks (bedrock)	Devonian	Upper Devonian	Upper Devonian rocks, undifferentiated	More than 5,000 feet.	Interbedded gray marine shale, siltstone, and sandstone overlain by interbedded nonmarine red and gray-green shale, siltstone, and conglomerate.	Most extensive and important bedrock aquifer in the county. Moderate amounts of iron occur in water from some wells drawing from these rocks, and excessive iron content is not uncommon. Wells have been reported to yield as much as 120 gpm. Water is generally soft.
		Middle Devonian	Hamilton group	Apparently 3,000± feet. Unit may be considerably thickened by repetition of beds due to thrust faulting.	Upper part consists of interbedded dark-to madium-gray shale and siltstone. Lower part not exposed in Sullivan County.	Not an important aquifer in the county because of great depth below land surface.
		Lower and Middle Devonian	Lower and Middle Devonian rocks, undifferentiated Includes: Onondaga limestone Oriskany sandstone Helderberg group	1,100± feet.	These rocks are not believed to crop out in Sullivan County. The Onondaga and Helderberg rocks consist chiefly of marine limestone; the Oriskany generally consists of marine siltstone and sandstone.	Not an important aquifer in the county because of great depth below land surface. No wells known to penetrate these rocks. Excessive hardness would be an expected characteristic of water from the calcareous rocks in this unit.
	Silurian	Lower(?) to Upper Silurian	Silurian rocks, undifferentiated Includes: Keyser limestone; includes beds of Lower Devonian (?) age Bossardville limastone Binnewater sandstone (Grabau, 1906, p. 124) High Falls shale Shawangunk conglomerate	1,400± feet. Thickness may have been increased by thrust faulting.	The Bossardville and Keyser limastones, if present, probably consist mainly of marine limastone and some shale. The High Falls shale consists chiefly of red and some gray shale and siltstone. The Binnewater sandstone consists principally of gray siltstone and sandstone. The Shawangunk conglomarate contains beds of fine to coarse quartz-pebble conglomerate, sandstone, quartzite and minor amounts of shale and siltstone. Faulted zones in this unit contain lead and zinc ores.	Not an important aquifer in the county. No wells are known to penetrate this unit and the quality of water is not known. It is possible, however, that undesirable quantities of lead, zinc, and copper may result from percolation of the water through mineralized, faulted zones of the Shawangunk conglomerate. The limestone strata can be expected to yield hard water.
			Unconformity			
	Ordovician	Middle(?) Ordovician	Hudson River formation of former usage (Snake Hill? formation) (Normanskill ? shale)	Approximately 1,000 feet exposed; total thickness not known.	Dark-to madium-gray marine shale intercalated with thin beds and lenses of siltstone and sandstone.	Underlies only a small area in southeastern part of county. Supplies adequate water for domestic use to drilled wells. Water is moderately hard to hard and in many places contains hydrogen sulfide.

a/ Thicknesses of consolidated rocks given are those in the vicinity of the Port Jervis Trough.

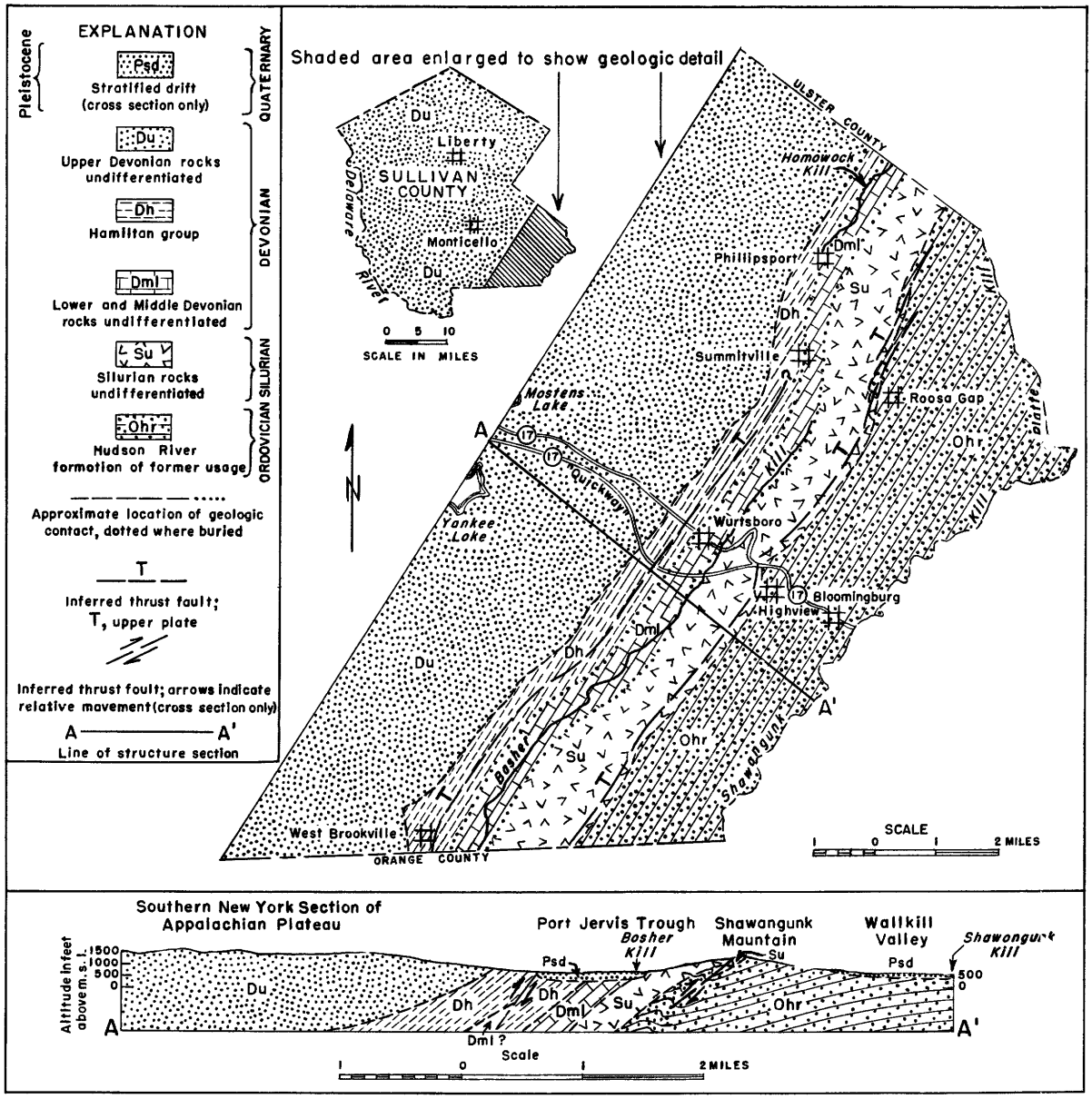

Figure 4.--Map and structure section showing bedrock geology of Sullivan County, N. Y.

Bossardville limestone, and Keyser limestone. The Keyser includes beds of Lower Devonian (?) age. The Shawangunk conglomerate is well exposed in the crest and west flank of Shawangunk Mountain. The remaining units, if present in the county, are buried beneath thick unconsolidated Quaternary deposits in the Port Jervis Trough.

Approximately the lower 750 feet of the Silurian rocks are referred to as the Shawangunk conglomerate which consists chiefly of sandstone and quartz-pebble conglomerate, some beds of quartzite, and scattered thin beds and lenses of shale and siltstone. The lowermost 20 feet of the Shawangunk consist of beds of distinctly coarse-grained conglomerate containing pebbles about 0.75 inch to 1 inch in diameter. Lead and zinc ores have

been mined from fault zones in the Shawangunk conglomerate in Sullivan County and in the nearby counties of Orange and Ulster.

The upper 650 feet of the Silurian rocks are believed to consist, in ascending order, of red, gray, and green shale, siltstone and sandstone of the High Falls shale, gray sandstone of the Binnewater sandstone (Grabau, 1906), and gray to bluish-black limestone of the Bossardville and Keyser limestones. Exposures of the High Falls shale and overlying sandstones believed to be the Binnewater sandstone have been observed by the author in the cut for the New York State Highway 17 "Quickway" in the west flank of Shawangunk Mountain. The Upper Silurian limestones are not exposed and if present are covered by Pleistocene deposits.

No records of wells or springs tapping the Silurian rocks in Sullivan County have been collected. Water from certain zones in the Shawangunk conglomerate may contain lead, zinc, and copper as a result of percolation through the mineralized zones in this unit.

Devonian System

Lower and Middle Devonian rocks, undifferentiated

Rocks of Early and Middle Devonian age overlie the Silurian rocks in Sullivan County and comprise approximately 1,100 feet of strata believed to include from the base upward, the Helderberg group and Oriskany sandstone of Early Devonian age and the Onondaga limestone of Middle Devonian age. These rocks form the bedrock floor of the Port Jervis Trough and are covered by a thick mantle of Quaternary deposits. The upper and lower contacts of these Lower and Middle Devonian rocks can be only approximately delineated because of the thick cover of unconsolidated deposits. The unit is overlain with apparent conformity by the basal beds of the Hamilton group of Middle Devonian age which is discussed in the following section.

In adjacent Orange and Ulster Counties, beds of the Helderberg and Onondaga are composed chiefly of marine limestone and the intervening rocks of the Oriskany are composed mainly of siltstone and sandstone. The Lower and Middle Devonian rocks in Sullivan County are too deeply buried to be of practical importance as a source of water, and nothing is known of their water-bearing character; however, excessive hardness could be expected because of the calcium and magnesium content of these rocks.

Hamilton group

The undifferentiated Lower and Middle Devonian rocks are overlain by beds of the Hamilton group, the upper part of which is exposed in the escarpment on the west side of the Port Jervis Trough. The contact of the Hamilton group with the Lower and Middle Devonian rocks is covered, but its position in the vicinity of the Orange County line is approximately known from one well (Sv 100, table 8) at West Brookville. This well penetrates the Quaternary deposits in the Port Jervis Trough and enters a black shale typical of the basal part (Marcellus shale) of the Hamilton group. The exposed beds of the Hamilton are mainly dark-to medium-gray shale and siltstone. The Hamilton strata grade upward into Upper Devonian, marine, medium-gray siltstone; fine to coarse, medium-gray sandstone; and thin, interbedded, medium-gray shale. The contact between the Hamilton group and

the overlying Upper Devonian rocks is gradational and is not readily apparent. Furthermore it is obscured in most places by unconsolidated Quaternary deposits. The contact is believed to be at a steepening in slope that occurs at an altitude of about 800 feet in the escarpment west of the trough. Above the change in slope, the rocks are predominantly medium-gray siltstone and sandstone. The apparent thickness of Hamilton rocks in the vicinity of West Brookville is approximately 3,000 feet, which appears to be unusually great. The thickness of the Hamilton group is estimated to be 1,650 feet in Greene County, about 40 miles to the north, (Berdan, 1954, p. 14), and nearly 2,000 feet at Brodhead Creek, in Pennsylvania, about 50 miles southwest (Willard, 1939, fig. 40). The narrowing of the Port Jervis Trough from Port Jervis northeastward through Sullivan County, and the crushed and highly jointed appearance of Hamilton beds along U. S. Highway 209, suggest the possibility that the Hamilton strata have been thickened by thrust faulting along the western edge of the trough.

No records of wells, other than Sv 100, or springs tapping the Hamilton group are available, and very little is known about the quality or yield of ground water. An analysis of water from well Sv 100 (see table 4) does not show it to be substantially different from water from the Upper Devonian beds. The Hamilton is not an important source of ground water in the county because it crops out only in a sparsely settled area of fairly steep slopes in the lower part of the Catskill escarpment, and is deeply buried west of the outcrop.

Upper Devonian rocks, undifferentiated

Most of Sullivan County is underlain by undifferentiated rocks of Late Devonian age. These rocks crop out from the upper slopes of the escarpment at the west side of the Port Jervis Trough westward across the county. The Upper Devonian rocks in Sullivan County have never been subdivided and for purposes of this report are referred to as "Upper Devonian rocks, undifferentiated."

The Upper Devonian rocks consist of an interbedded marine sequence of medium-gray siltstone, sandstone, and thin shale, overlain by an interbedded continental sequence consisting chiefly of red and gray-green shale, fine to coarse sandstone, and fine quartz-pebble conglomerate. Thin, flaggy, cross-bedding is a common feature in the continental sandstones. Sandstone is the predominant rock in both the marine and continental sequences. Thin beds and laminae of coal have been observed in the continental sequence. The marine rocks probably belong to the Trimmers Rock sandstone defined by Willard (1939, p. 208).

The upper contact of the marine rocks with the overlying continental strata is believed to be at the base of the first red stratum above the base of the escarpment west of the Port Jervis Trough. It is at this horizon that rock colors change from the predominating grays of the marine rocks to the predominant gray-greens and reds typical of the continental beds. No marine fossils have been found above this horizon in Sullivan County. On New York State Highway 17 "Quickway" in the vicinity of Wurtsboro, the contact is at an altitude of approximately 1,100 feet. In this area, the Upper Devonian marine unit is approximately 1,000 feet thick. The total thickness of Upper Devonian rocks in Sullivan County is probably more than 5,000 feet.

No records of wells and springs known to obtain water from the marine sequence of the Upper Devonian rocks are available. These rocks probably would supply sufficient water to wells for domestic purposes but, westward from their outcrop, they are too deeply buried to be of practical use as an aquifer.

The continental beds constitute the most important bedrock aquifer in the county. Deep wells tapping these rocks have been reported to yield as much as 120 gpm, and springs issuing from this unit have been reported to yield as much as 20 gpm. The water from the continental beds generally is soft and low in dissolved solids, but in places has a high iron content.

Quaternary System

Unconsolidated Quaternary deposits of Pleistocene and Recent age cover most of the bedrock in Sullivan County. These deposits range in thickness from a fraction of an inch to more than 600 feet. The Pleistocene mantle is composed of till and stratified deposits; the Recent deposits are composed chiefly of fine flood-plain alluvium. Plate 2 shows the distribution of the principal types of unconsolidated deposits in the county.

Pleistocene series

Till.--Till (also called unstratified drift) is an unstratified and unsorted mixture of clay and rock fragments ranging in size from small grains to large boulders. The relative proportions of the clay and rock fragments are highly variable from place to place. Most of the till in the county appears to have been laid down as lodgement till directly by the ice sheet that invaded the area from the north in Pleistocene time. The remainder is ablation till that was laid down during the melting of the ice. Lodgement till may be extremely compact and hard; such till is usually called "hardpan" by drillers. Ablation till is relatively loose material as it was merely dropped onto the ground as the enclosing ice melted. The thickness of till varies considerably from place to place, but generally is greatest in valleys and on hillsides and is least on hilltops. The thickness of till in the 164 wells listed in table 7, for which depths to bedrock were reported, averages 26 feet. Fluhr (1953, p. 143) describes deposits of "mainly impermeable glacial till" approximately 350 feet thick near the village of Craigie Clair and nearly 450 feet thick at Jersey Brook near the village of Beaver Kill, both in the valley of the Beaver Kill. Fluhr (1953, p. 143-144) also describes a deposit of till approximately 350 feet thick in the valley of Willowemoc Creek about 1 mile east of the village of Livingston Manor. A part of the till in these valleys may have slumped downhill from the steep valley sides.

Most of the shallow dug wells in Sullivan County tap till, and generally yield only a few hundred gallons of water a day. Wells that penetrate lenses of sand within the till are capable of higher yields. Dug wells can be constructed without specialized equipment, but they tend to fail in dry periods and are easily contaminated unless carefully placed with respect to barns, outhouses, septic tanks, and cesspools.

Stratified deposits.--Stratified deposits of gravel, sand, silt, and clay were laid down in most of the valleys in the county by streams issuing from the melting glacial ice. In many places the valleys contained lakes,

and where meltwater streams heavily laden with rock debris entered these lakes, deltaic deposits of sand and gravel were formed. Deposits of clay and silt, laid down in the deeper parts of these lakes, interfinger with the deltaic sand and gravel deposits. The most prominent delta in the county occurs in the Port Jervis Trough north of the village of Phillipsport. This delta was apparently formed by Sandburg Creek after the melting of the ice when the trough in this area was occupied by a lake.

The extent of the stratified deposits in the larger stream valleys in Sullivan County is shown on plate 2. Thicknesses of stratified deposits greater than 100 feet have been penetrated in the Basher, Delaware, Homowack, and Neversink valleys. Fluhr (1953, p. 127, 133-137) estimates that the unconsolidated deposits in the Port Jervis Trough at Phillipsport, most of which are probably stratified, are about 680 feet thick.

Saturated stratified deposits of coarse sand and gravel yield large quantities of water because of their high permeability. Yields of a few hundred gallons per minute are not uncommon for properly screened wells drawing water from these deposits. The villages of Wurtsboro, Narrowsburg, South Fallsburgh, Woodbourne, Callicoon, White Sulphur Springs, and Swan Lake have developed wells in stratified drift for public-supply purposes.

Recent series

Alluvium.--The Recent deposits in the county consist mainly of alluvium deposited by streams on their flood plains. These deposits consist chiefly of silt and fine sand and small amounts of fine gravel. The maximum thickness of these deposits probably does not exceed 10 feet and it is believed that most are less than 5 feet thick. In many places alluvium has been deposited on Pleistocene material and it is difficult to distinguish one from the other.

The Recent alluvium is not an important source of water because of its fine-grained character, small areal extent, and thinness.

Structure

Bedrock

A part or all of the bedrock exposed in Sullivan County has been deformed at least three times. The beds of the Hudson River formation were folded and fractured during the Taconic orogeny late in the Ordovician period. The area was elevated and possibly gently tilted during the Acadian disturbance, near the end of the Devonian period. During the Appalachian Revolution, near the end of the Paleozoic era, all the bedrock was folded and fractured. The most intense folding and fracturing occurred in the southeastern part of the county. The fracturing of the rocks resulted in two distinct types of openings: faults, openings along which differential displacement of the rocks has occurred; and joints, openings along which no movement or only slight movement has occurred. The occurrence and movement of ground water in the bedrock is affected greatly by the folds and fractures resulting from the Taconic, Acadian, and Appalachian orogenies.

Folds

Most of Sullivan County lies on the east side of a broad, shallow, northeast-trending, synclinal structure which gives the rocks a regional dip to the northwest. Superimposed on this regional dip is a more or less continuous series of broad, low folds. The axes of these folds are difficult to trace because the rocks do not contain distinct beds that can be traced for any appreciable distance and because of the relatively continuous cover of unconsolidated deposits. From the west side of the Port Jervis Trough eastward the rocks of the Ridge and Valley province lie in the northwest-dipping limb of an anticlinal structure whose crest lies east of the county.

Faults

The bedrock in Sullivan County has been displaced along numerous faults most of which are not apparent because they are obscured by the mantle of unconsolidated deposits. Evidence of a zone of thrust faults is seen on Shawangunk Mountain in the duplication of the basal beds of Shawangunk conglomerate at Roosa Gap and where New York State Highway 17 crosses the Shawangunk strata near Highview (fig. 4). The author has traced this fault zone southward from Sullivan County through Orange County and into New Jersey where duplication of the coarse basal beds of the Shawangunk conglomerate is well shown at High Point in New Jersey and along the west side of Lake Marcia in High Point Park. A double-pointed crest along parts of Shawangunk Mountain appears to be the topographic expression of a repetition of resistant Shawangunk rocks. Part of the fault zone appears to pass into the Hudson River formation east of Phillipsport. The displacement along the fault is estimated to be several hundred feet in Sullivan County and considerably more, perhaps a thousand feet or more, at High Point Park. Much of the lead and zinc ore in Shawangunk Mountain appears to be associated with this fault zone.

Another thrust fault of considerable displacement, perhaps more than 1,000 feet, is believed to lie at the western edge of the Port Jervis Trough. The presence of this fault is inferred from the great thickness and the closely jointed and highly sheared nature of the Hamilton group. The dips of the Shawangunk Mountain and Port Jervis Trough faults are not known but are inferred to be to the northwest at angles of approximately 35° and 50°, respectively. These faults were probably caused by compressive forces during the Appalachian Revolution.

Faults are not easily recognized from surface evidence in the plateau section of the county because of the thick Quaternary cover and lack of good marker beds. Fluhr (1953, p. 127, 133-137) describes faults traversed by tunnel workings in this area as mostly normal or tension faults.

Joints

The bedrock in Sullivan County is broken along numerous joints. The joints are generally perpendicular or nearly perpendicular to bedding planes of the strata. The spacing of joints varies considerably among the different types of bedrock. In the Shawangunk conglomerate, the most resistant rock exposed in the county, joints are generally several feet apart. In the so-called Hudson River formation, which is among the least resistant rocks exposed in the county, joints are generally only a few inches apart.

Bedding

The rocks of Sullivan County show the typical primary layered structure of sedimentary rocks. The bedding of strata ranges from shaly in the shales to massive in sandstones and conglomerates. Massive bedding is common in the Shawangunk conglomerate and Binnewater sandstone; flaggy bedding is generally observed in the Upper Devonian sandstones.

Unconsolidated Deposits

The unconsolidated deposits have been relatively undisturbed. These beds exhibit the general primary structural features of sediments, such as bedding and cross bedding, and secondary small faults and folds resulting from compaction and slumping. The effects of the secondary features on the occurrence and movement of ground water are negligible but the primary features may be important locally, especially where the deposits contain beds of clay.

Geologic History

The geologic history of the rocks now exposed in Sullivan County, as interpreted from Schuchert and Dunbar (1947), began with the deposition of the so-called Hudson River formation as muds in a shallow sea that covered the area in Middle Ordovician time. Deposition of sediments probably continued throughout the Late Ordovician epoch but was terminated toward the end of Ordovician time with the formation of the Taconic Mountains east of the Hudson River during the Taconic orogeny. The Ordovician rocks of Sullivan County were raised above sea level and folded and faulted during this orogeny. A period of erosion followed the Taconic uplift, and a nearly planar surface was developed on the strata of the Hudson River formation.

Early in the Silurian period, earth-crustal movements lowered the Ordovician rocks and they were covered by a shallow sea. The Shawangunk conglomerate was deposited in the vicinity of the shoreline of this sea as sand and gravel, derived from the erosion of the Taconic Mountains, across the planed surface of the Hudson River strata. The sea became deeper during Silurian time, and the depositional material changed from sand and gravel to mud, silt, sand, and limey mud which make up the sandstone, shale, and limestone of the Upper Silurian rocks. The High Falls shale and Binnewater sandstone appear to represent the transition from the shallow-water beds of the Shawangunk to the Upper Silurian marine limestones.

During the Early and Middle Devonian epochs, continued deepening of the sea provided the basin for deposition of the silt and limey mud of the Helderberg, Oriskany, and Onondaga sediments. Toward the middle of Devonian time, a second disturbance, the Acadian orogeny, uplifted the area to the east of Sullivan County and the depth of the sea covering the county was reduced. Deposition changed from limey mud to the siliceous mud and silt that formed the rocks of the Hamilton group.

Late in Devonian time, coarse sediments brought in from the Acadian highlands to the east, formed a vast delta across southern New York and Pennsylvania. This feature is known as the Catskill delta and is represented by the non-marine red, gray-green, and gray shale, sandstone, and conglomerate of the Upper Devonian rocks.

During the formation of the Appalachian Mountains, near the end of the Paleozoic era, the sediments were further uplifted, folded, and faulted. The Appalachian Revolution was followed by a long period of erosion, during which strata younger than Late Devonian, and also perhaps much of the Upper Devonian rocks of Sullivan County, were removed. Erosion apparently has been more or less continuous from late Paleozoic time to the present day with the exception of relatively brief periods of deposition in the Quaternary period.

In the Pleistocene epoch, Sullivan County was covered by a continental ice sheet which advanced over the area from the north. There is evidence of only one glaciation in Sullivan County. Although the ice front may have advanced and retreated more than once across the county, any evidence was destroyed or obscured during the last glaciation (Wisconsin stage). Glaciation was an agent of both erosion and deposition. During the advance of the ice over the area, most of the soil mantle was removed and bedrock was eroded to unknown depths. Much of this material was deposited as till. During the melting of the ice, meltwater streams deposited gravel, sand, silt, and clay as stratified drift in their courses and in lakes.

During the Recent epoch, deposition of alluvium has occurred in the stream channels and flood plains of the valleys. Erosion continues in the remainder of the county to the present.

GROUND WATER

Ground water is subsurface water that is in the zone of saturation, the zone in which all open spaces in the rocks are filled with water. The upper surface of the saturated zone is commonly referred to as the "water table" except where this upper surface is formed by an impermeable body. Ground water is recoverable, in varying amounts, from both the bedrock and unconsolidated deposits in Sullivan County. A summary of the stratigraphy and water-bearing properties of the geologic units in the county is shown in table 2.

Source

The source of ground water in Sullivan County appears to be solely precipitation on the area. Only a relatively small part of this precipitation, however, reaches the zone of saturation. Most of it runs off on the land surface to streams or is returned to the atmosphere by evaporation and plant transpiration. The amount of water that enters an aquifer is controlled by the slope of the land, the amount and types of vegetation, and permeability and porosity of the surficial cover. For example, water falling as light rain on flat permeable ground will provide more recharge to an aquifer than the same amount of water falling as heavy rain on steep slopes of relatively impermeable ground. However, water infiltrates to the zone of saturation to recharge the aquifer only after the soil moisture has been replenished.

Under natural conditions ground water moves toward streams and lakes where it discharges through springs and seeps. Pumping of a well near streams or lakes to a sufficiently great drawdown reverses the ground-water flow and induces the migration of the surface water toward the low-pressure zone created by pumping. Such induced infiltration is particularly

effective where wells tap unconsolidated deposits of coarse sand and gravel near perennial streams and permanent lakes that are hydraulically connected with these deposits. It is believed that induced infiltration occurs near most of the public-supply wells tapping sand and gravel deposits in the Neversink, Delaware, and Callicoon valleys.

The position of the water table is continually changing in response to variations in recharge and discharge. When recharge exceeds discharge, water levels rise; when discharge exceeds recharge, the levels fall. This variation of ground-water level can be readily discerned from a series of water-level measurements made in a well.

Periods of greatest recharge in Sullivan County generally occur in the late autumn and early spring. Evapotranspiration losses are greatest during the growing season, resulting in little or no recharge. Recharge occurs during the winter only during brief periods when the snow melts and the ground thaws. In the autumn, cooler weather and the cessation of plant growth gradually curtail evapotranspiration losses; in the early spring, the soil is generally saturated from slowly melting snow, facilitating percolation to the water table.

Availability

Ground water is present in Sullivan County in sufficient quantities to supply moderate to small needs. Plate 1 shows the distribution of the wells and springs visited in the field by U. S. Geological Survey personnel for the purposes of gathering ground-water data. The data obtained from the well and spring owners and well drillers are reported in tables 6, 7, and 8.

It is estimated, partly on the basis of information given in table 3, that approximately 4 billion gallons of ground water (about 0.6 percent of the annual precipitation) are drawn yearly from wells and springs in Sullivan County. Much of this water is returned to the ground through cesspools and septic tanks. Although it is believed that the aquifers of the county are capable of supporting greater exploitation, local ground-water shortages may occur as a result of excessive withdrawals, unfavorable geologic conditions, periods of insufficient precipitation, or any combination of these factors.

Ground water is recovered from wells and springs from three distinctly different types of aquifers in the county: bedrock, unconsolidated stratified deposits, and till. The distribution of the wells listed in table 7 among these aquifers is as follows: bedrock 265, unconsolidated stratified deposits 86, and till 73.

Some of the wells in table 7 are reported to flow or to have water levels above land surface. These are examples of artesian wells. However, not all artesian wells flow; such a well is defined as one in which the water level stands above the top of the aquifer. The water level in an artesian well can be higher than, the same as, or lower than the water table. Residents and well drillers in the county commonly refer to deep wells in bedrock as "artesian" wells. The water levels in most deep bedrock wells are probably under some artesian pressure. Wells Sv 11, Sv 12, Sv 13, Sv 81, Sv 83, Sv 198, Sv 233, Sv 250, Sv 255, Sv 282, Sv 348, Sv 393, and Sv 49[illegible] (table 7) are examples of artesian wells. Logs of test bore holes in rock,

Sv 111, Sv 112, Sv 115, Sv 119, Sv 122, and Sv 123 (table 8) show inflows and losses of water at various intervals which are ascribed to artesian pressures. Markedly different static water levels are common in bedrock wells of a locality because of the many complex artesian conditions in the bedrock. Layers of clay in sand and gravel deposits can serve as confining beds, causing local artesian pressures in these deposits (Sv 5 and Sv 42, table 7). A well tapping a permeable layer confined in till could have artesian characteristics; Sv 436, table 7, is probably such a well.

Bedrock

The bedrock is the most widespread aquifer in Sullivan County. It underlies the county at depths to more than 600 feet. The degree of interconnection between the various formations composing the bedrock is not known and, therefore, they are discussed as a hydrologic unit in this report. Most of the springs and wells drawing water from bedrock are in the continental phase of the Upper Devonian rocks, which underlie approximately 90 percent of the county. Relatively few wells and springs tap the older rocks because they are deeply buried.

The yield of the wells tapping bedrock listed in table 7 for which data were reported averages 21 gpm and ranges from 2 to 120 gpm. Most wells drawing water from bedrock are cased to the top of rock or a few feet into the rock and are finished with open holes for the remainder of their depths. The average penetration into bedrock of the wells listed in table 7 is 181 feet and the penetration of individual wells ranges from 2 to 590 feet. The average depth of the bedrock wells below land surface is 214 feet, and individual well depths range from 7 to 750 feet. The yield of wells tapping bedrock depends on the number, size, and degree of interconnection of fractures and other openings penetrated by the well. Presumably, the number and size of fractures and most other openings decrease with depth because of the pressure of the overlying strata. Bedrock which is highly fractured or thin-bedded, or both, is generally more porous and permeable than unfractured massive beds and is therefore capable of greater yield. Permeability due to fracturing may be very high locally. Fluhr (1953, p. 136) reports that an estimated 600 gpm of ground water flowed into the East Delaware Tunnel of the New York City water-supply system for an unspecified time, until sealed off by grouting, when it was driven through a fault zone near the Neversink River, about 2 miles north of the village of Curry. The yield of bedrock wells is sometimes increased by blasting in the well. Such a procedure undoubtedly increases the number of openings, particularly along tight fractures and bedding planes.

Unconsolidated Deposits

Stratified deposits

The most productive aquifer in Sullivan County consists of unconsolidated deposits of coarse stratified drift which underlie the larger and many of the smaller valleys. These deposits are more than 600 feet thick in parts of the Port Jervis Trough but only a few feet thick in small tributary valleys. The areal extent of the deposits is shown on plate 2. The width of a valley floor is not necessarily indicative of the thickness of the stratified drift underlying the valley. For example, the flood plain of Buck Brook, about 1.25 miles north of the village of North Branch,

is less than 200 feet wide but is underlain by at least 130 feet of stratified deposits. Along the West Branch of the Mongaup River, 0.5 mile north of Swan Lake, the flood plain is about 1,000 feet wide and the thickness of stratified deposits is only about 50 feet.

The stratified drift of Sullivan County has been exploited relatively little as a source of water. In some places, wells have been cased through thick deposits of stratified drift and water obtained from the underlying bedrock. Examples of such wells are Sv 100 and Sv 233 (table 7). Well Sv 100 penetrates 135 feet of unconsolidated stratified deposits in the Basher Kill valley to obtain water from underlying black shale in the Hamilton (?) group. A log of the well (table 8) indicates much clay in the stratified drift at the well site and several water-bearing sand and gravel beds. No log of well Sv 233, which is situated in the valley of Buck Brook, is available, but it is reported that bedrock was reached at a depth of 130 feet. Surface evidence of gravel beds in other parts of Buck Brook valley indicates that the unconsolidated deposits are stratified; however, it is not known whether these deposits are mainly coarse or fine. In some instances, bodies of stratified drift may be by-passed as aquifers because of the specialized techniques needed for proper construction of screened wells in such material.

The reported yields of 40 wells that penetrate stratified deposits average 175 gpm, and the range is from 2 gpm to about 700 gpm (see Sv 2, table 7, Remarks). Those wells in stratified drift for which drawdown data have been reported have an average specific capacity of about 23 gpm per foot of drawdown, which is the highest for any water-bearing formation in the county.

Till

Till is the most widespread unconsolidated deposit in the county. It covers most of the bedrock to depths ranging from a few feet to more than 400 feet. It is the least productive aquifer in the county and water in usable quantities can generally be obtained only from large-diameter dug wells which provide a large area for the infiltration of water and a large volume for storage of water between periods of use. Shallow dug wells in till are more readily contaminated than wells drilled in bedrock or deep wells in stratified deposits. As wells in till generally are dug only a few feet below the water table, many go dry or fail to yield an adequate quantity of water during dry seasons. The principal advantage of dug wells is that they can be constructed with inexpensive hand tools.

No reliable reports of yields from wells in till are available for Sullivan County. The owners of such wells report them either adequate or inadequate for the purposes originally intended, and in many cases, a drilled well or spring is also located on the property. The number of dug wells in use in the county is diminishing.

Springs

Springs are places where ground-water discharges naturally at the land surface. On most steep hillsides, ground water emerges from bedding planes and fractures in the bedrock and from the mantle of unconsolidated deposits. Springs may also occur where the contact between the bedrock and unconsolidated deposits intersects the land surface.

Many springs in the county have been developed for water-supply purposes, principally for domestic and farm use and, in some places, for public supplies. Data for selected springs are given in table 6. Many of the springs listed in the table have yielded reliable supplies of water for long periods of time, and yields of as much as 30 gpm have been reported by some owners.

Utilization

The population of Sullivan County, and consequently the use of water, ranges widely during the course of a year, being greatest in the summer because of the large number of people who vacation in the county.

Water used in the county is obtained from ground-water and surface-water sources to provide an estimated total of 5 billion gallons in 1958. Farms and rural homes, most public supplies, and nearly all vacation facilities not served by public supplies obtain water from wells and springs. The remaining public supplies, which include some of the larger supplies, obtain water from lakes and streams. It is estimated that about 90 percent of the water used during the summer and 75 percent of the water used during the remainder of the year is obtained from ground-water sources. About 80 percent of the ground water used in the summer and 50 percent of the ground water used in winter is drawn from individually owned wells and springs. The average daily use of ground water during July and August for all purposes is estimated to be about 50,000,000 gallons; the use during the remainder of the year is estimated to be about 3,000,000 gpd (gallons per day), a yearly total ground-water use of about 4 billion gallons. These estimates include allowances for the use of water in the numerous swimming pools in the area and for the larger consumption of water by most of the summer visitors than by the permanent residents.

Information on 32 of the public-water supplies in the county is listed in table 3. Of the supplies listed in the table, 23 obtain all water from ground-water sources, 3 obtain water from ground-water and surface-water sources, and 6 obtain all water from surface-water sources.

Quality

The water which falls on the surface of Sullivan County as precipitation is relatively pure. However, as this water percolates through the ground, it dissolves minute quantities of the materials through which it moves. The nature of the chemical constituents of the ground water is governed chiefly by the mineral composition of the soil and rock through which the water moves and the duration of the contact between the ground water and these materials.

Selected chemical analyses of water from wells and springs in the county, made by the New York State Department of Health and the U. S. Geological Survey, are given in table 4. Table 5 shows comparative data on water from bedrock and sand and gravel deposits, based on the analyses in table 4.

The U. S. Public Health Service has set standards for the concentration of certain chemical constituents permitted for drinking and culinary water used by interstate carriers subject to the federal quarantine regulations. Part of

Table 3.--Public water-supply systems in Sullivan County

Municipality, District, or Water Company	Water Works in charge of	Source of water	Treatment	Population (W) Winter (S) Summer	Percent of population served	Estimated consumption (gallons per day)	Source of data
Callicoon	Callicoon Water Co.	Wells and springs	Chlorination	500 (W) 600 (S)	90	60,000 (W) 75,000 (S)	(a)
Fallsburgh	Fallsburgh Town Board	Wells	None	500 (W) 10,000 (S)	90	35,000 (W) 700,000 (S)	(a)
Ferndale	Liberty Town Board	Wells and lakes (see Liberty)	Chlorination and ammoniation	100 (W) 1,500 (S)	--	4,300	(b)
Grahamsville	Grahamsville Water Supply Assoc.	Spring	None	60	--	2,500	(b)
Hankins	Mr. A. Kraft	Spring	None	300	20	4,000	(b)
Hurleyville	Mr. M. Frouman	Well	Chlorination	500 (W) 1,500 (S)	20	5,000 (W) 10,000 (S)	(a)
Hurleyville	Mr. B. Knapp	Springs and wells	Chlorination	500 (W) 1,500 (S)	30	50,000 (S)	(b)
Indian Field Assoc.	Indian Field Assoc.	Well	None	90	100	6,000	(b)
Jeffersonville	Board of Trustees	Springs and Liekel Brook	Chlorination	600 (W) 800 (S)	98	50,000	(a), (b)
Kiamesha	Kiamesha Spring Water Co.	Wells and Kiamesha Lake	Chlorination	1,500 (W) 10,000 (S)	95	200,000 (W) 750,000 (S)	(a)
Lake Paradise	Minnewaska Estates, Inc.	Springs	None	150	100	10,000	(b)
Liberty	Board of Water Commissioners	Lily Pond and Revonah Lake	Chlorination and ammoniation	4,800 (W) 6,500 (S)	95	500,000 (W) 1,200,000 (S)	(a)
Livingston Manor	Rockland Town Board	Hardensbergh Brook	Chlorination	1,600	85	300,000	(b)
Loch Sheldrake Assoc. (Loch Sheldrake vicinity)	Loch Sheldrake Assoc.	Well	None	50	--	2,000	(b)
Loch Sheldrake Park (Loch Sheldrake vicinity)	Hercules Estates, Inc.	Wells	None	300	100	15,000	(b)
Loch Sheldrake	Lazarus Levine	Well	None	60	100	6,000	(b)
Long Eddy	Long Eddy Water Co.	Well	Chlorination	300	75	30,000	(b)
Monticello	Board of Water Commissioners	Kiamesha Lake	Chlorination, ammoniation, and filtration	5,000 (W) 12,000 (S)	100	600,000 (W) 1,500,000 (S)	(a), (b)

(a) Information supplied by public-supply activity.

(b) Information taken from "Public Water Supply," Bulletin 19, New York State Department of Health, 1954.

Table 3.--Public water-supply systems in Sullivan County (Continued)

Municipality, District, or Water Company	Water Works in charge of	Source of water	Treatment	Population (W) Winter (S) Summer	Percent of population served	Estimated consumption (gallons per day)	Source of data
Narrowsburg	Tusten Town Board	Wells	None	500 (W) 1,500 (S)	100	80,000 (W) 180,000 (S)	(a)
Oakland Valley	M. Galligan	Bush Kill, Gulf Stream	Chlorination	200 (S)	100	15,000	(b)
Roscoe Heights	Dr. M. E. Miller	Spring	Chlorination	50	100	5,000	(b)
Roscoe Water Co.	Roscoe Water Co.	Woods Brook, Aux. Lake	Chlorination	1,600	100	185,000	(b)
Sackett Lake	Mr. J. Schultz	Well	None	--	--	4,000	(b)
Smallwood	A. N. Smallwood and Co., Inc.	Wells	Chlorination	0 (W) 2,000 (S)	90	0 (W) 150,000 (S)	(a)
South Fallsburgh	Fallsburgh Town Board	Wells	None	1,600 (W) 15,000 (S)	90	100,000 (W) 1,500,000 (S)	(a)
Swan Lake	Liberty Town Board	Wells	Chlorination	2,500	100	250,000 (W) 700,000 (S)	(a)
White Sulphur Springs	Liberty Town Board	Wells	None	1,000	30	50,000	(b)
Woodbourne	Water Commissioner	Wells	Chlorination	1,200 (W) 7,500 (S)	70	75,000 (W) 450,000 (S)	(a)
Woodridge	Board of Trustees	East Pond	Chlorination and corrosion control	1,000 (W) 5,000 (S)	100 (W) 60 (S)	70,000 (W) 210,000 (S)	(a), (b)
Wurtsboro	Board of Water Commissioners	Well	Chlorination	487 (W) 800 (S)	100	50,000	(b)
Wurtsboro Hills	Wurtsboro Hills Water Corp.	Wells	None	423 (W) 2,000 (S)	100	100,000	(b)
Youngsville	Board of Water Commissioners	Springs	Chlorination	200 (W) 1,000 (S)	65	20,000 (W) 100,000 (S)	(b)

(a) Information supplied by public-supply activity.

(b) Information taken from "Public Water Supply," Bulletin 19, New York State Department of Health, 1954.

Table 4.--Chemical analyses of water from wells and springs in Sullivan County

(Analyses by New York State Department of Health except where otherwise noted. Chemical constituents in parts per million)

Well or spring number	Depth (feet)	Location	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)		Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness		Alkalinity ($CaCO_3$)	Specific conductance	pH
						Total	Dissolved												Total	Noncarbonate			
Sv 1	21	Wurtsboro	Pleistocene sand and gravel	12-21-55	--	0.50	--	--	--	--	--	--	--	--	4.6	0.1	2.0	--	70	--	37	--	7.0
Sv 2[a/]	30	do.	do.	7-23-57	5.2	.16	0.02	0.00	18	3.3	3.3	2.6	55	12	4.2	.0	5.8	86	59	14	--	143	6.5
Sv 7	350	Wurtsboro Hills	Upper Devonian rocks, undifferentiated	8-27-56	--	1.2	--	--	--	--	--	--	--	--	2.2	.2	.5	--	72	--	54	--	7.3
Sv 9	224	Masten Lake	do.	7-26-56	--	.15	--	--	--	--	--	--	--	--	1.0	--	.1	--	48	--	52	--	6.6
Sv 12	138	Kiamesha	do.	6-26-56	--	.17	--	--	--	--	--	--	--	--	5.8	--	.3	--	68	--	72	--	7.7
Sv 13	440	do.	do.	5-26-54	--	.17	--	--	--	--	--	--	--	--	3.8	.2	.3	--	66	--	70	--	7.7
Sv 14	384	Hurleyville	do.	8-30-49	--	.25	--	--	--	--	--	--	--	--	4.4	.1	.4	--	42	--	63	--	7.1
Sv 17	200	do.	do.	8-15-56	--	.15	--	--	--	--	--	--	--	--	8.2	--	1.0	--	38	--	50	--	6.9
Sv 18	365	Sackett Lake	do.	8-12-55	--	3.6	--	--	--	--	--	--	--	--	2.6	--	.6	--	72	--	59	--	6.5
Sv 19	260	Melody Lake	do.	7- 9-56	--	.30	--	--	--	--	--	--	--	--	1.2	--	.3	--	46	--	41	--	6.5
Sv 20	170	Merriewold	do.	8-22-55	--	.15	--	--	--	--	--	--	--	--	1.0	--	.0	--	18	--	6	--	6.1
Sv 23[a/]	40	Swan Lake	Pleistocene sand and gravel	7-22-57	5.1	.07	.04	.00	4.4	1.2	1.2	.5	6	9.0	1.4	.1	3.6	28	16	11	--	44	5.8
Sv 29	200	Lake Paradise	Upper Devonian rocks, undifferentiated	8-25-54	--	.15	--	--	--	--	--	--	--	--	1.2	.2	.1	--	42	--	40	--	7.3
Sv 41	102	Bethel	do.	8-27-56	--	1.2	--	--	--	--	--	--	--	--	7.4	--	.3	--	70	--	59	--	6.7
Sv 42	57	Smallwood	Pleistocene sand and gravel	9-23-54	--	2.0	--	--	--	--	--	--	--	--	1.0	.2	.2	--	50	--	41	--	7.3
Sv 47	315	White Lake School	Upper Devonian rocks, undifferentiated	9-16-48	--	2.0	--	--	--	--	--	--	--	--	7.0	.1	.0	--	54	--	28	--	5.9
Sv 55	300	Liberty	do.	9-21-49	--	.10	--	--	--	--	--	--	--	--	1.6	< .05	1.0	--	44	--	65	--	7.5
Sv 57	57	Narrowsburg	Pleistocene sand and gravel	4-19-56	--	.10	--	--	--	--	--	--	--	--	7.8	--	1.8	--	58	--	27	--	6.0

a/ Analysis by U. S. Geological Survey.

Table 4.--Chemical analyses of water from wells and springs in Sullivan County (Continued)

Well or spring number	Depth (feet)	Location	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)		Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Hardness		Alkalinity ($CaCO_3$)	Specific conductance	pH
						Total	Dissolved												Total	Noncarbonate			
Sv 58[a/]	41	Narrowsburg	Pleistocene sand and gravel	7-23-57	9.0	0.11	0.03	0.02	14	5.2	6.5	1.8	37	20	8.1	0.2	--	94	57	26	--	157	6.3
Sv 63	148	Fallsburg	do.	8-13-56	--	.12	--	--	--	--	--	--	--	--	6.0	--	0.1	--	58	--	70	--	--
Sv 66	290	Callicoon	Upper Devonian rocks, undifferentiated	8- 1-51	--	2.1	--	--	--	--	--	--	--	--	7.8	<.05	.2	--	44	--	61	--	6.8
Sv 84[a/]	125	Barryville	do.	7-23-57	14.0	.05	.04	.00	14	4.5	5.0	.5	63	9.5	1.0	.2	2.6	69	54	2	--	113	7.1
Sv 100[a/]	195	West Brookville	Hamilton group	7-23-57	9.4	.45	.04	.00	21	4.9	3.3	.4	91	4.9	1.1	.1	.0	88	73	0	--	151	7.6
Sv 102[a/]	150	Callicoon Center	Upper Devonian rocks, undifferentiated	7-22-57	5.4	.07	.01	.00	19	2.6	2.4	1.0	58	8.2	2.6	.0	6.7	80	58	11	--	133	7.3
Sv 411[b/,c/]	30	Parksville	Pleistocene sand and gravel	1- 4-57	5.0	.10	--	.10	14	2.9	--	--	--	<30	25	.0	--	80	46	18	28	--	6.2
Sv 411[b/,d/]	30	do.	do.	1- 7-57	5.0	.10	--	.00	13	1.7	--	--	--	<30	23	.0	--	27	40	14	26	--	5.9
Sv 452[a/]	400	Liberty	Upper Devonian rocks, undifferentiated	7-23-57	11.0	.57	.03	.00	14	3.8	8.5	1.1	68	6.3	2.0	.1	6.6	82	51	0	--	138	6.9
Sv 1Sp	--	Roscoe Heights	Pleistocene till[e/]	8-30-54	--	.45	--	--	--	--	--	--	--	--	.4	.1	.2	--	26	--	17	--	7.3
Sv 6Sp	--	Youngsville	do.	6-28-56	--	.20	--	--	--	--	--	--	--	--	2.2	--	.1	--	30	--	13	--	6.7
Sv 12Sp	--	Loomis	do.	10-20-54	--	.40	--	--	--	--	--	--	--	--	4.2	.2	.3	--	54	--	37	--	7.1
Sv 14Sp	--	Hurleyville	do.	10-21-52	--	2.0	--	--	--	--	--	--	--	--	6.8	.1	2.0	--	32	--	16	--	6.0
Sv 15Sp	--	Callicoon	Upper Devonian rocks, undifferentiated	4- 9-54[f/]	--	.15	--	--	--	--	--	--	--	--	3.2	.1	1.8	--	26	--	9	--	6.3
Sv 16Sp	--	do.	do.																				
Sv 18Sp	--	do.	Pleistocene till[e/]																				
Sv 26Sp	--	Lake Paradise	Upper Devonian rocks, undifferentiated	9- 6-50	--	.40	--	--	--	--	--	--	--	--	1.6	.1	.1	--	28	--	30	--	6.8

a/ Analysis by U. S. Geological Survey. b/ Analysis furnished by Village of Liberty (analysis made at Columbus Water and Chemical Testing Laboratory, Columbus, Ohio).

c/ Sample collected after 72 hours of pumping. d/ Sample collected after 2 hours of pumping.

e/ Water emerges at surface from till. The water is probably derived, at least in part, from Upper Devonian rocks. f/ Composite sample.

Table 5.--Comparative summary of chemical analyses of ground water from bedrock and stratified drift in Sullivan County

(Chemical constituent expressed in parts per million)

Constituent or characteristic	Ground water from bedrock			Ground water from stratified drift		
	Number of analyses	Range	Median	Number of analyses	Range	Median
Silica (SiO_2)	4	5.4 to 14	10.2	5	5.0 to 9.0	5.1
Iron (Fe)	20	.05 to 3.6	.17	9	.07 to 2.0	.16
Manganese (Mn)	4	.00	--	5	.00 to .10	--
Calcium (Ca)	4	14 to 21	17	5	4.4 to 18	14
Magnesium (Mg)	4	2.6 to 4.9	4.2	5	1.2 to 5.2	2.9
Sodium (Na)	4	2.4 to 8.5	4.2	3	1.2 to 6.5	3.3
Potassium (K)	4	.4 to 1.1	.8	3	.5 to 2.6	1.8
Bicarbonate (HCO_3)	4	58 to 91	66	3	6 to 55	37
Sulfate (SO_4)	4	4.9 to 9.5	7.3	5	9 to <30	20
Chloride (Cl)	20	1.0 to 8.2	2.4	9	1.0 to 25	6.0
Fluoride (F)	13	.0 to .2	.1	7	.0 to .2	.1
Nitrate (NO_3)	20	.0 to 6.7	.3	6	.1 to 5.8	1.9
Dissolved solids	4	69 to 88	81	5	27 to 94	80
Hardness (total)	20	18 to 73	50	9	16 to 70	57
Hardness (noncarbonate)	4	0 to 11	1	5	11 to 26	14
Alkalinity (as $CaCO_3$)	16	6 to 72	53	6	26 to 41	33
Specific conductance, in micromhos at 25°C	4	113 to 151	136	3	44 to 157	143
pH	20	5.9 to 7.7	6.9	8	5.8 to 7.3	6.3

these standards are listed in the following table because they are of general interest:

Constituent	Maximum allowable concentration, parts per million 1/
Fluoride (F)	2/ 1.5
Iron (Fe) and Manganese (Mn)	.3
Chloride (Cl)	250
Sulfate (SO_4)	250
Total Solids	3/ 500

1/ United States Public Health Service, 1946, Public Health Service Drinking Water Standards, 1946: Public Health Reports, v. 61, no. 11, p. 371-384.

2/ Mandatory limit.

3/ Total solids up to 1,000 ppm are permissible where better water is not available.

Hardness

Water having a hardness of less than 60 ppm (parts per million) is considered as soft and water having a hardness of from 60 to 120 ppm is considered as moderately hard. Most of the 33 analyses given in tables 4 and 5 show hardnesses below 60 ppm; a few hardnesses above 60 ppm are given, 73 ppm being the maximum concentration known. These analyses are, with one exception, from waters in post-Hamilton rocks and Pleistocene sand and gravel. One analysis of water believed to have come from the Hamilton rocks is listed in table 4 (Sv 100); the analysis shows the highest hardness of any of the analyses in the table. Hardness would probably be much higher in water from the limestone of Silurian and Devonian ages; however, no wells or springs which derive water from these rocks are known in Sullivan County. Excessive hardness has been reported for waters from the so-called Hudson River formation by well owners, but no analyses of these waters are available for Sullivan County. Since the formation is calcareous in part, excessive hardness of ground water would be a normal characteristic for these strata.

Iron

The iron content for approximately one-third of the analyses listed in table 4 is higher than the maximum (0.3 ppm of iron and manganese) given in the U. S. Public Health Service standards. The analyses show generally greater amounts of iron in water from bedrock than in water from Pleistocene sand and gravel deposits. Excessive amounts of iron are not necessarily

injurious to health; however, excessive amounts of iron may cause a disagreeable taste, leave stains on porcelain and clothing, and clog water pipes.

Manganese

Only 2 of the 9 water samples that were analyzed for manganese content contained any of this chemical constituent. One sample contained 0.02 and the other 0.1 ppm of manganese. Both samples were from wells tapping Pleistocene sand and gravel.

Sulfate and Chloride

Sulfate and chloride concentrations shown in table 4 are considerably below the recommended limit of 250 ppm for these constituents. The greatest concentration shown in the analyses was less than 30 ppm for sulfate and 25 ppm for chloride. One well in table 7 (Sv 109) reportedly yielded salty water but no analysis of the water is available.

Fluoride

None of the analyses shown in table 4 shows excessive fluoride content, and in all of the analyses, the fluoride content is well below the allowable maximum. According to Stadt (1954, p. 1) it may be concluded that fluorides of 0.5 to 1.5 ppm lessen the dental caries experience of individuals who consumed water with such amounts during infancy and childhood. The analyses shown in table 4 do not indicate harmful or beneficial amounts of fluoride concentrations.

pH

The pH value of ground water is indicative of its acidity or alkalinity. Values above 7.0 indicate alkalinity, and values below 7.0 indicate acidity; a value of 7.0 indicates a neutral condition. Strongly acid or alkaline waters are corrosive and generally undesirable. The New York State Department of Health has set a range of pH value between 6.5 and 8.5 as acceptable for fresh surface water to be used for drinking and culinary or food processing purposes (New York State Dept. of Health, 1950, p. 6-7). The pH values given in table 4 show the ground waters tested to be generally slightly acidic.

Hydrogen Sulfide

Hydrogen sulfide (H_2S) has been frequently reported in water from wells in the so-called Hudson River formation. No chemical analyses of water from this unit are available for Sullivan County; however, the author has noted the characteristic hydrogen-sulfide odor and taste of some waters from wells in the Hudson River formation. Sulfur taste and odor were extremely strong in the water from well Sv 498. Occasional reports of natural gas, salt, and "sulfur" from wells in the Upper Devonian rocks have been received. Gas, salt, and "sulfur" were reported to render water from well Sv 109 unusable; "blackish" and "oily" water was reported from well Sv 399; and "sulfur" was reported in wells Sv 226 and Sv 418.

Lead, Zinc, and Copper

Lead, zinc, and traces of copper are known to occur in faulted zones of the Shawangunk conglomerate, and it is possible that ground water from these zones contains considerable quantities of lead, zinc, and copper. No record of water known to be taken from wells and springs in the Silurian rocks of Sullivan County is available; consequently no data are available on the quality of the water from these formations.

Temperature

Water temperatures were measured at 33 wells and 96 springs. The average temperatures of water from the wells was 52°F and the range was from 44°F to 60°F. Temperatures of water from springs averaged 50°F and ranged from 44°F to 60°F. A weighted average of ground-water temperature from both sources is 51°F. The fluctuations of ground-water temperature are greatest near the surface where the ground water is most affected by the wide range in air temperature. At greater depths, ground-water temperatures are more nearly constant except where disturbed by man; for example, in places where ground water is recharged through wells with hot water from air-conditioning systems. According to Collins (1925, p. 98) the temperature of the ground water for practical purposes at depths from 20 to 200 feet is about 3°F to 6°F above the mean annual air temperature, and the differential between ground-water and mean annual air temperatures increases with depths greater than 300 feet.

SUMMARY

The main source of water supply in Sullivan County is ground water. Available information indicates that about a total of 4 billion gallons of ground water is used annually. Most ground water is pumped during the months of July and August when large numbers of people vacation in the area. The total water use of the county is estimated to have been approximately 5 billion gallons in 1958. The difference between current needs and the ground-water withdrawal is provided from surface-water sources. Individually owned wells and springs provide nearly 80 percent of the ground water used in the summer and 50 percent of the ground water used in the winter.

Ground water is taken from three geologic media in the county: Paleozoic bedrock, Pleistocene till, and Pleistocene stratified drift. The largest yields are obtainable from coarse stratified drift, which generally is highly permeable. The most widely exploited unit at the present time is the bedrock because it is the most commonly available aquifer. Till is relatively little used as an aquifer because of its low yield and poor reliability.

In a few localities, large public-water supplies are obtained from deposits of Pleistocene sand and gravel. These deposits are used as a source of supply by many individuals and by the villages of Callicoon, Narrowsburg, South Fallsburgh, White Sulphur Springs, Woodbourne, and Wurtsboro.

Most of the wells in the county are bedrock wells (average depth, 214 feet). Most of the bedrock within economical drilling depth is of Late Devonian age and consists chiefly of gray-green sandstone with smaller

amounts of grayish-green shale, grayish-green siltstone, grayish-green conglomerate, red shale, red siltstone, red sandstone, and red conglomerate, all of continental origin. Ground water is obtained from marine shale of Ordovician age in a small area in the southeastern part of the county.

The quality of water from the Upper Devonian rocks and the Pleistocene outwash deposits generally is suitable for domestic and farm uses. Most of the water from these aquifers is soft, but in a few places it is moderately hard. Low pH values indicate that most of the water from these units is slightly acidic, particularly water from the outwash deposits. Excessive amounts of iron were reported in approximately one-third of the analyses of water from the Upper Devonian rocks and the unconsolidated deposits. Reports of excessive hydrogen sulfide and hardness have been received from owners of wells tapping the so-called Hudson River formation. Information on other characteristics of water from this formation is not available.

The ground-water supply of Sullivan County is adequate for present needs and appears to have a potentially greater yield. The best areas for development of large ground-water supplies are believed to be in the bodies of stratified drift, particularly in the larger valleys. These deposits have been developed relatively little except locally.

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Table 6.--Records of selected springs in Sullivan County

Location: See "Well-Location System" for explanation of location.

Altitude: Estimated from topographic map.

Principal water-bearing unit: Du, Upper Devonian rocks, undifferentiated; H, Hamilton group; HR, Hudson River formation of former usage; P, Pleistocene deposits; Pcs, Pleistocene silt and sand; Pg, Pleistocene gravel; Ps, Pleistocene sand; Psg, Pleistocene sand and gravel; Pt, Pleistocene till.

Yield: Figure followed by date is measurement made by U. S. Geological Survey; figure without date is reported by owner.

Temperature: All measurements made by U. S. Geological Survey.

Use: PS, public supply; Dom, domestic; Com, commercial; Res, resort.

Remarks: (a) For chemical analysis, see table 4.

Spring number	Location	Owner or occupant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					Rate (gpm)	Date	(°F)	Date		
Sv 1Sp	13T, 4.5S, 5.6E	M. E. Miller	1,880	P	10	--	--	--	PS	(a). Sv 1Sp and Sv 2Sp supply approximately 20 families.
Sv 2Sp	13T, 4.6S, 5.6E	do.	1,880	P	5	--	--	--	PS	Sv 1Sp and Sv 2Sp supply approximately 20 families.
Sv 3Sp	15V, 2.5N, 2.1W	L. Brown	600	H	15	--	49	12/ 4/56	Dom	Has high iron content.
Sv 4Sp	13T, 7.8S, 4.5E	--	1,700	Du	15	--	44	11/20/56	--	
Sv 6Sp	14T, 5.4N, 6.3E	Village of Youngsville	1,400	P	10	--	--	--	PS	(a). Another spring nearby furnishes additional supply.
Sv 7Sp	14T, 6.6N, 2.1W	Freiberger and Rubino	1,240	P	8	--	--	--	Com	Supplies motor vehicle service station.
Sv 8Sp	15U, 4.1N, 0.7W	J. Bott	1,120	P	10	--	44	11/14/56	Dom	Has supplied three homes in past.
Sv 9Sp	14T, 3.2N, 5.2E	--	1,140	Du	3	--	49	10/25/56	--	
Sv 10Sp	14V, 7.6S, 6.3W	Gildick Sand and Gravel Co.	1,200	Pcs	2	--	51	10/18/56	--	
Sv 11Sp	15U, 5.5N, 2.2E	Merriewold Country Club	1,580	P	Dry	10/23/56	--	--	PS	Not dry in prior years.
Sv 12Sp	14U, 3.3N, 1.8W	J. Schroeder	1,740	P	20	--	--	--	PS	(a).
Sv 13Sp	14U, 1.5S, 3.3E	B. Knapp	1,520	Du	--	--	--	--	PS	
Sv 14Sp	14U, 1.7S, 3.6E	do.	1,540	Pt	--	--	--	--	PS	(a).
Sv 15Sp	14T, 2.0N, 2.3W	Callicoon Water Co.	1,360	Du	10	--	--	--	PS	(a).
Sv 16Sp	14T, 1.7N, 2.4W	do.	1,360	Du	5	--	--	--	PS	(a).
Sv 17Sp	14T, 2.1N, 2.5W	do.	1,280	Du	20	--	--	--	PS	Yields 6 to 7 gpm in summer.
Sv 18Sp	14T, 1.7N, 3.4W	do.	1,000	Pt	5	--	--	--	PS	(a).
Sv 27Sp	14U, 5.9S, 3.4E	Medoff	1,440	Psg(?)	6	6/ 7/57	48	6/ 7/57	Dom	

Table 6.--Records of selected springs in Sullivan County (Continued)

Spring number	Location	Owner or occupant	Altitude above sea level (feet)	Principal water-bearing unit	Yield Rate (gpm)	Yield Date	Temperature (°F)	Temperature Date	Use	Remarks
Sv 28Sp	14U, 2.6S, 1.3E	Fisher	1,160	Pt	--	--	53	6/ 7/57	Dom	Supplies nine homes and store. Yield decreases in summer but is adequate.
Sv 29Sp	14T, 5.4N, 2.5W	A. Newman	1,440	Pt	3	--	45	6/10/57	Dom, Stock	Supplies 2 homes and 35 cows.
Sv 30Sp	14T, 4.2N, 0.4W	C. Banuat	1,220	Pt	--	--	--	--	Dom	Yield fluctuates relatively little.
Sv 31Sp	14T, 2.6N	W. Kratz	1,300	Pt	--	--	--	--	Dom	
Sv 32Sp	14T, 1.7N, 0.3W	Berszinn	1,160	P	20	--	49	6/10/57	Dom, Stock	Supplies 10 cows and 1,000 chickens.
Sv 33Sp	14T, 2.3N, 1.2W	H. Renner	900	Du	2	--	--	--	Dom, Stock	Supplies 12 cows and 4,000 chickens.
Sv 34Sp	14T, 3.6N, 1.1W	A. Sellman	1,290	Pt	3	--	--	--	Dom, Stock	Supplies 30 cows.
Sv 35Sp	14T, 2.3N, 2.0W	F. Gair	1,080	Pt	--	--	48	6/10/57	Dom, Stock	Supplies 20 cows and 100 chickens.
Sv 36Sp	14T, 1.0N, 2.3W	M. E. Wahl	860	Du	7	6/10/57	55	6/10/57	Dom	Supplies two homes. Lower yield during summer, but never dry.
Sv 37Sp	14T, 0.2N, 0.8W	H. Knapp	1,060	Du	--	--	50	6/10/57	Dom, Stock	Supplies 1,300 mink. Never dry.
Sv 38Sp	14T, 2.3N, 4.3W	L. Mitterwager	1,150	Pt	1	6/10/57	53	6/10/57	Dom, Stock	Supplies 2 homes and 3 cows. Dry some summers.
Sv 39Sp	14T, 3.2N, 2.7W	J. Lord	1,380	Pt	--	--	49	6/10/57	Dom, Stock	Supplies 40 cows and 200 chickens.
Sv 40Sp	14T, 8.4N, 2.8W	Morristurk	1,640	Pt	> 1	--	--	--	Dom, Stock	Supplies 14 cows.
Sv 41Sp	14T, 9.6N, 2.3W	C. Raye	1,460	Pt	--	--	53	6/11/57	Dom	Yield insufficient in late summer.
Sv 42Sp	14T, 10.5N, 1.7W	I. Calkins	1,530	P	10	--	47	6/11/57	Dom	
Sv 43Sp	14T, 10.7N, 0.9W	A. McAdams	1,760	Pt	--	--	--	--	Dom	Decrease in yield in summer.
Sv 44Sp	14T, 9.6N, 1.8W	H. Morrison	1,600	Pt	2	--	48	6/11/57	Dom	Do.
Sv 45Sp	14T, 9.5N, 0.6W	C. F. McAdams, Sr.	1,860	Pt	--	--	50	6/11/57	Dom	Do.
Sv 46Sp	14T, 7.3N, 1.6W	M. Prett	1,460	Pt	.5	--	48	6/11/57	Dom, Stock	Supplies two cows. Decrease in yield in summer.
Sv 47Sp	14T, 6.7N, 1.2W	Gettle	1,470	Pt	--	--	--	--	Dom, Stock	Supplies 500 chickens. Decrease in yield in summer.
Sv 48Sp	14T, 5.1N, 3.2W	F. Simon	1,380	Pt	--	--	--	--	Dom, Stock	
Sv 49Sp	14T, 3.7N, 3.2W	Karban	1,330	Pt	3	--	47	6/12/57	Dom	Decrease in yield in summer.
Sv 50Sp	14T, 4.7N, 2.0W	Bindokat	1,500	Pt	--	--	52	6/12/57	Dom, Stock	Supplies 6 cows and 500 chickens. Decrease in yield in summer.

Table 6.--Records of selected springs in Sullivan County (Continued)

Spring number	Location	Owner or occupant	Altitude above sea level (feet)	Principal water-bearing unit	Yield Rate (gpm)	Yield Date	Temperature (°F)	Temperature Date	Use	Remarks
Sv 51Sp	14T, 7.7N, 3.6W	Salmi	1,580	Pt	--	--	49	6/12/57	Dom	Decrease in yield in summer.
Sv 52Sp	14T, 6.7N, 4.0W	A. Kellam	1,480	Pt	--	--	50	6/12/57	Dom	Do.
Sv 53Sp	14T, 6.5N, 4.9W	C. Simon	1,580	Pt	--	--	50	6/12/57	Dom, Stock	Do.
Sv 54Sp	14T, 4.9N, 3.8W	C. A. Harts	1,130	Pt	--	--	--	--	Dom, Stock	Supplies 2 cows and 100 chickens. Decrease in yield in summer.
Sv 55Sp	14T, 4.6N, 4.3W	B. Nadlar	830	Du	.3	--	49	6/12/57	Dom	
Sv 56Sp	14T, 6.2N, 5.8W	W. Fransen	900	P	6	--	49	6/12/57	Dom	
Sv 57Sp	14T, 7.0N, 5.8W	Chamberlain	960	Pt	--	--	--	--	Dom	Supplies four homes.
Sv 58Sp	14T, 8.4N, 5.0W	H. Temple	1,060	P	7	--	47	6/12/57	Dom	
Sv 59Sp	14T, 8.2N, 4.3W	R. Anderson	1,200	P	2	--	47	6/12/57	Dom	Supplies two homes.
Sv 60Sp	14T, 8.2N, 0.3W	H. Hilcox	1,640	Du	--	--	46	6/14/57	Dom	Dry every summer.
Sv 61Sp	13U, 5.2S, 4.2W	C. Ackerley	1,530	P	9	--	46	6/14/57	Dom	Supplies six homes.
Sv 62Sp	13U, 2.3S, 4.4W	New York State	1,880	Pt	.3	6/14/57	48	6/14/57	--	
Sv 63Sp	13U, 1.6S, 4.2W	F. Kinch	1,630	P	8	--	48	6/14/57	Dom, Stock	Supplies 3 homes and 2 horses.
Sv 64Sp	13U, 0.9S, 4.6W	F. Hoelfle	1,640	Du	4	--	47	6/14/57	Dom	Supplies four families.
Sv 65Sp	13U, 2.0S, 3.2W	B. Morsey	2,100	Pt	2	--	48	6/14/57	Dom, Stock	Supplies 10 chickens.
Sv 66Sp	13U, 3.2S, 3.3W	D. DeWitt	2,000	Pt	--	--	--	--	Dom, Stock	Supplies 12 cows.
Sv 67Sp	13U, 6.1S, 3.4W	M. Rudolph	1,830	Pt	--	--	49	6/14/57	Res	Supplies up to 50 people.
Sv 68Sp	13U, 2.6S, 0.2W	Boy Scouts of America, Nassau County Council	2,200	Pt	--	--	--	--	--	Not used. Wells now used for camp.
Sv 69Sp	13U, 4.2S, 1.1W	J. J. Reilly	1,900	Du	3	--	50	6/17/57	Dom	Sometimes dry.
Sv 70Sp	13U, 5.0S, 0.8W	P. DeVoe	1,780	P	9	--	48	6/17/57	Dom, Stock	Supplies 18 cows.
Sv 71Sp	13U, 6.5S, 2.0W	A. Seeley	1,650	Du	4	--	--	--	Dom, Stock	
Sv 72Sp	13U, 6.2S, 0.4W	H. Vanaken	1,600	Du	1	6/17/57	49	6/17/57	--	
Sv 73Sp	13U, 7.1S, 1.0W	H. Sprague	1,840	Pt	--	--	53	6/17/57	Dom	
Sv 74Sp	13U, 4.9S, 5.4W	E. Rosiecki	1,420	Pt	.5	--	53	6/18/57	Dom	
Sv 75Sp	13U, 1.9S, 5.6W	Marble	1,560	Pt	--	--	45	6/18/57	Dom	Dry in summer.

Table 6.--Records of selected springs in Sullivan County (Continued)

Spring number	Location	Owner or occupant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					Rate (gpm)	Date	(°F)	Date		
Sv 76Sp	13T, 2.3S, 6.5E	B. C. Hardenburgh	1,460	P	7.5	6/18/57	58	6/18/57	Dom	
Sv 77Sp	14T, 8.2N, 3.8E	J. Kenley	1,600	Pt	1.5	6/18/57	48	6/18/57	Dom	
Sv 78Sp	13T, 5.9S, 4.0E	--	1,920	Pt	2	--	60	6/18/57	--	
Sv 79Sp	13T, 5.4S, 4.8E	W. Oles	1,350	Pt	--	--	50	6/18/57	Dom	Insufficient yield in some summers.
Sv 80Sp	14U, 7.8N, 2.8W	W. Rogow	1,800	Pt	2	6/19/57	47	6/19/57	Dom	Supplies four homes.
Sv 81Sp	14U, 1.2N, 4.0W	A. Buntler	1,490	Pt	2	--	--	--	Dom, Stock	Supplies 2 homes and 8 cows.
Sv 82Sp	14U, 5.0N, 2.2W	V. Gaston	2,040	Du	--	--	50	6/19/57	Dom	Sometimes dry.
Sv 83Sp	14U, 6.2N, 2.7W	Seidel	1,960	Psg	--	--	44	6/19/57	Dom	
Sv 84Sp	14U, 6.9N, 1.7W	J. Hurwitz	1,730	Du	--	--	--	--	Dom	
Sv 85Sp	14U, 5.4N, 1.7W	F. Benton	1,800	Pt	--	--	--	--	Dom	
Sv 86Sp	14T, 6.3N, 5.9E	G. Deere	1,540	Pt	--	--	--	--	Dom, Stock	Supplies 25 cows.
Sv 87Sp	14U, 5.4N, 5.0W	C. Miller	1,540	Du	2	--	48	6/20/57	Dom	
Sv 88Sp	14U, 6.5N, 4.5W	S. Kaufman	1,920	Du	1	--	48	6/21/57	Dom	Dry in some summers.
Sv 89Sp	14U, 5.0N, 5.6W	P. Rosengrant	1,460	Pt	--	--	50	6/21/57	Dom	
Sv 90Sp	13U, 8.0S, 4.7W	G. Rose	1,580	Du	--	--	50	6/21/57	Dom	Water clogs pipes frequently.
Sv 91Sp	13T, 6.5S, 5.1E	H. A. Millard	1,460	Pt	2	6/21/57	45	6/21/57	Dom	Supplies two homes.
Sv 92Sp	14T, 7.0N, 3.4E	W. Weisman	1,350	Pt	--	--	45	6/21/57	Dom, Stock	
Sv 93Sp	14T, 5.5N, 2.4E	F. Steinhauer	1,250	Pt	--	--	--	--	Dom, Stock	Went dry once.
Sv 94Sp	14T, 4.4N, 1.9E	L. B. Wagner	1,200	Pt	1.5	--	48	6/21/57	Dom	Supplies three homes.
Sv 95Sp	14T, 3.6N, 0.9E	J. Carman	1,250	Pt	--	--	47	6/21/57	Dom, Stock	Supplies one cow.
Sv 96Sp	14T, 5.9N	F. Feigenputd	1,600	Pt	4	--	--	--	Dom, Stock	Occasionally dry.
Sv 97Sp	14T, 3.5N, 2.1E	G. Hubert	1,490	Pt	2	6/24/57	50	6/24/57	Dom, Stock	
Sv 98Sp	14T, 1.5N, 4.3E	C. Kurtch	1,220	Du	--	--	50	6/24/57	Dom, Stock	
Sv 99Sp	14T, 1.0N, 2.9E	E. Ahnstrom	1,060	Pt	--	--	57	6/24/57	Dom, Stock	
Sv 100Sp	14T, 1.8N, 0.7E	W. Werlau	1,520	Pt	--	--	--	--	Dom	
Sv 101Sp	14T, 2.1N, 1.9E	H. Layman	1,490	Pt	.5	6/24/57	53	6/24/57	Dom, Stock	

Table 6.--Records of selected springs in Sullivan County (Continued)

Spring number	Location	Owner or occupant	Altitude above sea level (feet)	Principal water-bearing unit	Yield Rate (gpm)	Yield Date	Temperature (°F)	Temperature Date	Use	Remarks
Sv 102Sp	14T, 2.7N, 1.1E	F. Tanjes	1,500	Pt	2	--	--	--	Dom, Stock	
Sv 103Sp	14T, 5.4N, 1.7E	P. Botsalas	1,700	Pt	--	--	49	6/24/57	Dom	
Sv 104Sp	13T, 8.8S, 2.5E	J. Conroy	1,920	Pt	1	--	--	--	Dom	
Sv 105Sp	14T, 7.6N, 2.8E	C. Gilbert	1,520	Du	2	--	--	--	Dom, Stock	
Sv 106Sp	14T, 7.7N, 1.4E	M. Mills	1,720	Pt	.3	6/25/57	59	6/25/57	Dom, Stock	Supplies 14 cows in winter. Went dry in 1955.
Sv 107Sp	14T, 6.4N, 0.9E	H. DeBona	1,360	Pt	2	--	47	6/25/57	Dom	
Sv 108Sp	14T, 3.0N, 3.2E	W. Hupke	1,350	Pt	--	--	--	--	Dom, Stock	Supplies 33 cows. Went dry in 1955.
Sv 109Sp	14T, 3.4N, 4.4E	J. Schwirzer	1,530	Du	4	6/25/57	--	--	Dom, Stock	Supplies 50 cows. Dry in some summers.
Sv 110Sp	14T, 5.7N, 4.3E	E. Hyzer	1,640	Pt	1.5	6/25/57	50	6/25/57	Dom, Stock	Supplies 46 cows.
Sv 111Sp	14T, 8.6N, 4.7E	F. Hagel	1,820	Pt	.3	6/25/57	60	6/25/57	Dom	Water leaves iron stain.
Sv 112Sp	13T, 8.5S, 5.7E	J. Wojtowicz	1,990	Pt	--	--	48	6/25/57	Dom, Stock	50 chickens supplied. Dry in some past years.
Sv 113Sp	14U, 2.2N, 6.3E	R. Cross	1,430	Pt	2	6/26/57	48	6/26/57	Dom, Stock	
Sv 114Sp	14U, 4.2N, 5.9E	A. Bensky	1,400	Psg	2	--	50	6/26/57	Dom	
Sv 115Sp	13U, 4.0S, 2.9E	A. Roosa	2,200	Du	4	--	44	6/26/57	Dom	
Sv 116Sp	13U, 5.7S, 3.5E	Weitman	1,930	Psg	25	6/27/57	47	6/27/57	Dom	Spring feeds pond and creek.
Sv 117Sp	13U, 4.5S, 5.0E	Bragherol	1,920	P	30	--	45	6/27/57	Dom	
Sv 118Sp	13U, 6.1S, 2.6E	Krutwig	1,840	Pt	--	--	57	6/27/57	Dom	
Sv 119Sp	14U, 6.9N, 2.4E	M. Betansky	2,030	Du	.5	6/28/57	57	6/28/57	Dom, Stock	
Sv 120Sp	14U, 6.1N, 0.4E	V. Brown	1,840	Du	1.8	6/28/57	51	6/28/57	Dom	
Sv 121Sp	14U, 7.9N, 1.6E	J. Flamenbaum	1,920	Pt	--	--	47	6/28/57	Dom	
Sv 122Sp	13U, 6.6S, 4.5E	J. White	2,200	Pt	3	--	46	6/28/57	Dom	
Sv 123Sp	13U, 6.1S, 4.7E	--	2,280	Pt and Du	2	7/ 1/57	51	7/ 1/57	--	
Sv 124Sp	13V, 6.0S, 6.5W	C. Holmes	2,200	P	15	--	52	7/ 1/57	Dom, Stock	Supplies 2 homes and 1 cow.
Sv 125Sp	14U, 8.1N, 6.6E	J. Johnston	1,860	Pt	--	--	48	7/ 1/57	Dom	
Sv 126Sp	14V, 5.7N, 6.5W	J. McGuire	1,630	Pt	--	--	--	--	Dom, Stock	Supplies 55 head of cattle.

Table 6.--Records of selected springs in Sullivan County (Continued)

Spring number	Location	Owner or occupant	Altitude above sea level (feet)	Principal water-bearing unit	Yield Rate (gpm)	Yield Date	Temperature (°F)	Temperature Date	Use	Remarks
Sv 127Sp	14T, 0.4S	A. Berner	1,100	Pt	--	--	--	--	Dom, Stock	Supplies 10 cows.
Sv 128Sp	14T, 0.5S, 0.9W	H. Roemer	840	Pg	--	--	--	--	Dom, Stock	Supplies eight cows.
Sv 129Sp	14T, 1.4S, 1.2E	C. Raum	960	Pt	--	--	54	7/ 2/57	Stock	Supplies 1,800 chickens. Dry some summers.
Sv 130Sp	14T, 2.5S, 0.3E	H. Schulman	1,135	Pt	--	--	53	7/ 2/57	Dom	
Sv 131Sp	14T, 2.1S, 2.5W	W. Rieger	800	Pt	--	--	59	7/ 2/57	Dom, Stock	Supplies 2 homes and 3,000 chickens.
Sv 132Sp	14T, 4.7S, 2.7W	L. Rapp	740	Psg	5	--	48	7/ 2/57	Dom	Supplies four homes.
Sv 133Sp	14T, 5.2S, 1.4W	B. Wolff	950	Pt	--	--	--	--	Dom	
Sv 134Sp	14T, 3.7S, 0.4W	J. Messina	1,110	Pt	--	--	--	--	None	
Sv 135Sp	14T, 1.8S, 1.5E	Vanderlaan	1,160	Pt	--	--	--	--	Dom, Stock	
Sv 136Sp	14T, 1.1S, 6.2E	A. Fischer	1,290	Pt	--	--	--	--	Dom	
Sv 137Sp	14T, 4.4S, 6.0E	N. B. Brown	1,320	Pt	--	--	54	7/ 3/57	Dom	
Sv 138Sp	14T, 1.7S, 5.7E	Allgeier	1,200	Pt	--	--	58	7/ 3/57	Dom, Stock	
Sv 139Sp	14T, 1.7S, 4.5E	F. Bernhardt	1,150	Pt	0.5	7/ 4/57	50	7/ 4/57	Dom	
Sv 140Sp	14T, 2.6S, 3.8E	L. W. Rose	1,300	Du	--	--	--	--	Dom	
Sv 141Sp	13U, 6.9S, 0.8E	E. Marscheider	2,160	Du	2	--	--	--	Dom	Dry some summers.
Sv 142Sp	14U, 3.6S, 0.2W	F. Jacob	1,160	Psg	2	7/ 8/57	55	7/ 8/57	Dom	Water sometimes has blue-green color.
Sv 143Sp	14T, 7.0S, 0.1W	H. Sewing	1,160	Pt	--	--	58	7/ 8/57	Dom	
Sv 144Sp	15T, 7.8N, 1.3W	A. Dexter	1,120	Pt	--	--	--	--	Dom	Supplies three homes.
Sv 145Sp	15T, 5.7N, 0.1W	A. Valenti	920	Pt	2	7/11/57	54	7/11/57	None	
Sv 146Sp	15T, 6.3N, 1.0E	J. Hensz	990	Du	3	--	--	--	Dom	Supplies two homes.
Sv 147Sp	14T, 4.6S, 2.7E	J. Bernas	1,135	Pt	--	--	53	7/11/57	Dom, Stock	Occasionally dry. Water leaves blue stain.
Sv 148Sp	14T, 8.0S, 2.0E	A. Schalch	1,240	Pt	--	--	55	7/12/57	Dom	Generally dry in summer.
Sv 149Sp	14U, 8.4S, 6.6E	Iroquois Club, Inc.	1,280	Pt	--	--	--	--	Dom	Supplies three homes.
Sv 150Sp	15T, 5.4N, 2.8E	Boy Scouts of America	1,250	Pt	2.5	7/12/57	49	7/12/57	Dom	Supplies two homes.
Sv 151Sp	15T, 4.0N, 1.0W	do.	700	Pt	5	7/12/57	49	7/12/57	--	
Sv 152Sp	15T, 4.7N, 1.6W	H. Conklin	680	Psg	8	--	50	7/12/57	Dom	

Table 6.--Records of selected springs in Sullivan County (Continued)

Spring number	Location	Owner or occupant	Altitude above sea level (feet)	Principal water-bearing unit	Yield		Temperature		Use	Remarks
					Rate (gpm)	Date	(°F)	Date		
Sv 153Sp	15T, 1.2N, 6.0E	R. Meyers	900	Ps	--	--	--	--	Dom, Stock	Supplies 1,500 chickens.
Sv 154Sp	15U, 8.1N, 5.0E	C. Price	1,475	Pt	1	7/16/57	48	7/16/57	Dom	
Sv 155Sp	14T, 1.1S, 3.4E	J. Bernhardt	1,200	Pt	--	--	57	7/ 3/57	Dom	
Sv 156Sp	15U, 0.8N, 5.2E	Honig	850	Du	--	--	54	9/ 5/57	Dom	
Sv 157Sp	15U, 2.6N, 3.4E	D. Balch	1,250	Du	--	--	53	9/ 5/57	Dom	
Sv 158Sp	15U, 3.2N, 5.2E	--	840	Du	2	9/ 9/57	54	9/ 9/57	--	
Sv 159Sp	14V, 5.4S, 5.0W	J. Simihtis	1,200	Du	--	--	--	--	Swimming pool	28,000 gallons pumped twice each summer to fill pool.
Sv 160Sp	15V, 1.4N, 5.1W	G. Schmidt	1,180	Du	1.5	--	--	--	Dom	
Sv 161Sp	15V, 2.8N, 3.9W	V. C. Page	1,000	Du	1.5	--	--	--	Dom	
Sv 162Sp	15V, 6.9N, 4.7E	Anderson	650	HR	3	--	--	--	Dom	
Sv 163Sp	15V, 6.5N, 4.0E	M. Libolt	870	HR	3	--	--	--	Dom	
Sv 164Sp	14V, 7.3N, 7.9W	A. Ackerly	1,320	Du	3.5	--	--	--	Dom	
Sv 165Sp	14V, 5.2N, 1.2W	V. Curry	1,600	Du	Dry	11/14/57	--	--	Dom	Usually flows about 4 gpm.
Sv 166Sp	14V, 5.3N, 1.4W	do.	1,450	Du	--	--	--	--	Dom	
Sv 167Sp	14V, 7.9N, 4.1W	B. Derman	1,220	Du	4	--	--	--	Dom	
Sv 168Sp	14T, 2.6S, 0.8W	M. Busch	1,280	Pt	--	--	59	7/ 2/57	Dom	

Table 7.--Records of selected wells in Sullivan County

Location: See "Well-Location System" for explanation of location.

Altitude: Estimated from topographic maps.

Type of well: Drl, drilled; Drv, driven.

Water-bearing unit: Du, Upper Devonian rocks, undifferentiated; Hs, Hamilton group (?) (shale); HR, Hudson River formation of former usage; P, Pleistocene deposits; Pd, Pleistocene drift; Pg, Pleistocene gravel; Ps, Pleistocene sand; Psg, Pleistocene sand and gravel; Pt, Pleistocene till.

Water level: Measurements made by the U. S. Geological Survey are reported to nearest tenth of a foot. Measurements supplied by well drillers and well owners are reported to nearest foot.

Use: Com, commercial; Dom, domestic; Ind, industrial; Inst, institution; PS, public supply; Res, resort; TB, test boring; TW, test well.

Remarks: gpm, gallons per minute; gpd, gallons per day; (a), chemical analysis in table 4; (b), log of well in table 8.

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 1	15V, 4.7N, 0.9E	Wurtsboro Water Dept.	1947	520	Drl	21	8	--	Psg	10	160	PS	(a).
Sv 2	15V, 4.7N, 0.9E	do.	1956	520	Dug	30	72	--	Psg	7	250	PS	(a). Gravel-packed; lower 30 inches of well screened. Drawdown 10 ft after pumping 700 gpm for 16 hours.
Sv 3	15V, 7.1N, 0.2E	Wurtsboro Hills Water Dept.	--	1,220	Drl	234	8	30	Du	--	See remarks	PS	Reportedly yields as much as 100 gpm; decreases to es low as 15 gpm in summer.
Sv 4	15V, 6.7N, 0.4W	do.	--	1,160	Drl	270	6	--	Du	--	--	PS	Reportedly yields as much as 70 gpm; decreases to as low as 30 gpm in summer.
Sv 5	15V, 6.8N, 1.6E	Cardney Brook Farm	1948	580	Drl	144	6	--	Psg	flows	2.25 (flow) 10/18/56	Res	Well reported to barely flow 4 ft above land surfece.
Sv 6	15V, 6.7N, 1.5E	A. Bakal	--	580	Drl	65	6	--	Psg	20	20	Dom	
Sv 7	15V, 7.0N, 1.1W	Mountain Lake Property Owners Assn.	1947	1,470	Drl	350	8	0	Du	--	90	PS	(a) (b).
Sv 8	15V, 6.6N, 1.0W	do.	prior to 1938	1,240	Drl	280	8	40	Du	--	--	None	Formerly used for public supply.
Sv 9	15V, 7.2N, 2.5W	Masten Lake Land Development Co.	--	1,560	Drl	224	6	73	Du	--	50	PS	(a).
Sv 10	14V, 8.7S, 4.7W	C. Rice	1945	1,400	Drl	126	6	15	Du	35	5	Dom	
Sv 11	14U, 4.8S, 4.6E	Kiamesha Artesian Spring & Water Co.	--	1,390	Drl	131	8	35	Du	flows	50 (flow)	PS	Drawdown 131 ft after pumping at 255 gpm for several hours.
Sv 12	14U, 4.8S, 4.6E	do.	1900	1,390	Drl	138	8	35	Du	flows	15 (flow)	PS	(a).
Sv 13	14U, 4.8S, 4.6E	do.	--	1,390	Drl	440	8	35	Du	flows	50 (flow)	PS	(a).
Sv 14	14U, 1.5S, 3.5E	B. Knapp	1947	1,460	Drl	384	6	10	Du	--	25	PS	(a).
Sv 15	14U, 1.6S, 3.4E	do.	prior to 1943	1,500	Drl	285	6	30	Du	--	25	PS	High iron content reported.
Sv 16	14U, 1.4S, 3.4E	do.	--	1,460	Drl	265	8	10	Du	--	40	PS	
Sv 17	14U, 0.5S, 3.7E	Frouman	prior to 1945	1,430	Drl	200	8	--	Du	--	25	PS	(a).
Sv 18	15U, 8.7N, 0.3E	Sackett Lake Development Corp.	--	1,340	Drl	365	6	--	Du	--	50	PS	(a).
Sv 19	15U, 7.0N, 4.5E	Melody Lake Acres	--	1,440	Drl	260	6	55	Du	--	40	PS	(a).
Sv 20	15U, 5.4N, 2.2E	Merriewold Country Club	--	1,520	Drl	170	6	--	Du	40	20	PS	(a).
Sv 21	15U, 5.7N, 2.0E	St. Joseph's School	1948	1,440	Drl	243	8	75	Du	33	45	Inst	
Sv 22	15V, 5.3N, 0.5E	Wurtsboro Gardens	--	600	Drl	170	6	20	Du	--	12	Res	Supplies swimming pool.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 23	14U, 0.7N, 3.0W	Stevensville Water District	1949	1,340	Drl	40	12	--	Psg	6	215	PS	(a). Drawdown 21 ft when pumped at 215 gpm; duration of test not known. Screen between 30 and 40 ft.
Sv 24	14U, 0.7N, 3.1W	do.	1949	1,340	Drl	36	12	--	Psg	7	149	PS	(a). Drawdown 26 ft when pumped at 149 gpm; duration of test not known. Screen setting 26 to 36 ft.
Sv 25	14U, 0.6N, 3.1W	do.	1956	1,340	Drl	43	10	43	Psg	3	210	PS	(b). Drawdown 26 ft when pumped at 217 gpm. Screen setting 33 to 43 ft.
Sv 26	14U, 3.2N, 1.7W	J. Schroeder	--	1,700	Drl	469	8	25	Du	163	25	PS	(b). Well goes dry when pumped at 25 gpm for 24 hours. Supplies 25 families.
Sv 27	14U, 3.4N, 2.1W	Liberty-Loomis Hospital	1952	1,860	Drl	565	8	105	Du	250	40	Inst	Drawdown 200 ft when pumped at 40 gpm.
Sv 28	14T, 1.7N, 3.6E	Dr. Maisel	1935	1,280	Drl	302	6	--	Du	--	20	Dom	
Sv 29	14V, 6.6N, 4.8W	Minnewaska Estates	1954	1,720	Drl	200	6	--	Du	--	10	PS	(a).
Sv 31	14V, 6.2N, 5.2W	J. Murphy	1956	1,400	Drl	210	6	29	Du	35	16	Dom	
Sv 41	14T, 7.0S, 6.4E	Indian Fields Assn.	1948	1,320	Drl	102	6	18	Du	22	16	PS	(a).
Sv 42	14U, 6.3S, 2.6W	Village of Smallwood	--	1,120	Drl	57	12	--	Psg	+5	600	PS	(a) (b). Static water level reported at 5 ft above land surface. Screen setting 47 to 57 ft. Drawdown 45 ft when pumped at 600 gpm for several hours.
Sv 43	14U, 6.1S, 3.6W	do.	--	1,220	Drl	225	8	40	Du	--	22	PS	Condemned and abandoned.
Sv 44	14U, 6.2S, 3.1W	do.	--	1,200	Drl	180	6	20	Du	--	17	PS	Do.
Sv 45	14U, 6.1S, 3.9W	do.	--	1,360	Drl	170	6	25	Du	--	17	PS	
Sv 46	14U, 6.4S, 3.5W	do.	--	1,220	Drl	144	8	30	Du	--	50	PS	
Sv 47	14U, 4.8S, 4.0W	White Lake School	1950	1,360	Drl	315	10	60	Du	--	40	Inst	(a).
Sv 48	15T, 2.1N, 6.4E	Eldred Kindergarten and Central School	--	1,030	Drl	250	8	--	Du	--	35	Inst	
Sv 49	14T, 3.2N, 3.7W	Delaware Valley Central School	1949	1,230	Drl	487	8	40	Du	60	25	Inst	
Sv 51	14T, 1.5N, 3.0W	St. Joseph's Seraphic Seminary	1955	1,000	Drl	295	6	20	Du	60	10	Inst	Another drilled well 420 ft deep nearby.
Sv 53	14T, 2.7S, 1.1E	Cochecton Recreational Farm Society, Inc.	--	1,360	Drl	265	6	18	Du	165	40	Res	Two additional drilled wells 185 and 225 ft deep nearby. Wells supply up to 140 people in summer.
Sv 55	14U, 3.8N, 1.8E	Workmen's Circle Sanitorium	--	1,520	Drl	300	6	--	Du	--	50	Res	(a). Well reportedly could not be pumped dry at 50 gpm.
Sv 56	14U, 3.8N, 1.8E	do.	--	1,540	Drl	390	6	--	Du	--	30	Res	
Sv 57	15T, 7.2N, 3.6W	Narrowsburgh Water Dept.	1947	690	Drl	57	8	--	Psg	20	171	PS	(a) (b). Screen setting 42 to 57 ft. Drawdown 19 ft when pumped at 150 gpm for 24 hours.
Sv 58	15T, 7.5N, 3.7W	do.	1956	690	Drl	41	16	102	Psg	24	287	TW	(a) (b). Drawdown 2 ft when pumped at 287 gpm for 8 hours. Screen setting 29 to 41 ft.
Sv 59	14U, 2.3S, 6.2E	S. Fallsburgh Water District	1940	1,220	Drl	145	10	--	Psg	5	190	PS	(b). Screened from 110 to 145 ft. Drawdown 124 ft when pumped at 190 gpm for 48 hours.
Sv 60	14U, 2.6S, 6.2E	do.	1940	1,221	Drl	144	10	146	Psg	14	212	PS	(b). Screened from 104 to 144 ft. Drawdown 106 ft when pumped at 212 gpm.
Sv 61	14V, 2.3S, 6.0W	do.	1945	1,140	Drl	177	10	187	Psg	28	375	PS	(b). Screened from 147 to 177 ft. Drawdown 27 ft when pumped at 375 gpm.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 62	14V, 1.0S, 5.5W	S. Fallsburgh Water District	1948	1,175	Drl	162	10	166	Psg	17	280	PS	(b). Screened from 132 to 162 ft. Drawdown 40 ft when pumped at 280 gpm.
Sv 63	14V, 0.7S, 5.4W	do.	1949	1,180	Drl	148	10	--	Psg	16	205	PS	(a) (b). Screened from 128 to 148 ft. Drawdown 88 ft when pumped at 205 gpm.
Sv 64	14V, 0.7S, 5.3W	do.	1954	1,180	Drl	133	8	150	Psg	12, winter 70, summer	319	PS	(b). Screened from 113 to 133 ft. Drawdown 82 ft when pumped at 319 gpm. Yield drops to 90 gpm in summer.
Sv 65	14V, 5.1W	Fallsburgh Water District	--	1,170	Drl	150	6	--	Psg	4.6 11/ 8/56	250	TW	
Sv 66	14T, 1.4N, 3.4W	Callicoon Water Co.	1905	800	Drl	290	6	--	Du	170	50	PS	(a).
Sv 67	14V, 0.1N, 5.1W	Woodbourne Correctional Institution	1933	1,177	Drl	43	6	--	Psg	10	50	Inst	Screen 21 ft, setting unknown.
Sv 68	14V, 0.2N, 5.1W	do.	1933	1,179	Drl	44	8	--	Psg	11	100	Inst	Screen 20 ft, setting unknown.
Sv 69	14V, 0.4N, 5.2W	do.	1933	1,179	Drl	42	6	--	Psg	10	50	Inst	Do.
Sv 70	14V, 0.5N, 5.2W	do.	1933	1,178	Drl	43	8	--	Psg	8	100	Inst	Do.
Sv 71	14V, 0.5N, 4.7W	do.	1956	1,190	Drl	47	8	--	Psg	7.8 11/ 8/56	50	Inst	Screen 10 ft, setting unknown.
Sv 72	15T, 5.2N, 3.8E	Silver Lake Farms	1946	1,200	Drl	92	6	16	Du	29	40	Res	
Sv 73	15T, 4.0N, 0.6E	Tenmile River Boy Scout Camp	1949	1,180	Drl	300	6	--	Du	50	50	Res	
Sv 74	15U, 4.2N, 0.6E	W. Bott	1950	1,100	Drl	162	6	--	Du	45	20	Dom	
Sv 75	15U, 0.7S, 3.2W	E. Bisland	1935	1,420	Drl	278	4	--	Du	100	5	Dom	
Sv 76	15U, 0.7S, 3.2W	do.	1906	1,420	Dug	17	36	--	Psg	13.1 11/14/56	5	Dom	Reported to have dried up twice in past 20 years.
Sv 77	15U, 0.9S, 3.3W	A. W. Steel	--	1,420	Drl	273	6	--	Du	135	18	Dom, Com	Supplies home and restaurant.
Sv 78	15U, 4.0N, 0.1E	T. Toomey	1932	1,280	Drl	97	6	6	Du	--	5	Dom	
Sv 79	15U, 0.7N, 1.9W	A. W. Steel	1946	1,370	Drl	405	6	--	Du	35	10	Farm	
Sv 80	14T, 3.0S, 3.2W	Borden Co.	1916(?)	800	Drl	165	6	20	Du	--	25	Ind	Pumpage approximately 9,000 gpd.
Sv 81	14T, 6.7N, 1.9W	H. Brehm	1955	1,320	Drl	208	6	--	Du	flows	5 (flow)	Dom	Temperature of water 49°F, 11/15/56.
Sv 82	15U, 4.7S, 0.3W	Rockland Power & Light Co.	--	520	Dug	20	36	--	Psg	13.4 11/12/56	--	Dom	Not used. Reported to be polluted.
Sv 83	15U, 3.9S, 3.7W	J. Baran	1947	520	Drl	134	6	--	Du	flows	30 (pump)	Dom	Supplies rooming house. Reported to flow most of the year.
Sv 84	15T, 1.3S, 4.4E	Reber's Hotel	1952	600	Drl	125	6	--	Du	--	30	Dom	(a). Supplies hotel. Water level reported to be near land surface.
Sv 85	14T, 1.5S, 2.3E	Armbrust House	--	1,160	Dug	29	120	--	Psg	13.2 11/12/56	--	Dom	
Sv 86	14T, 1.6S, 2.5E	do.	--	1,120	Dug	6	120	--	Psg	2	--	Res	Supplies up to 79 people in summer.
Sv 87	14T, 1.4S, 2.6E	G. Henn	1950	1,100	Drl	230	6	25	Du	45.9 11/12/56	--	None	Not in use. Drilled well 205 ft deep nearby.
Sv 89	14V, 2.4N, 5.5W	Woodbourne Water District	1956	1,220	Drl	143	10	--	Psg	3 2/29/56 9 6/27/56	252	PS	(b). Screened from 123 to 143 ft. Drawdown 119 ft when pumped at 252 gpm after 14 hours.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 90	15V, 0.5N, 3.5W	B. Wygante	1875	600	Dug	14	30	--	Psg	12.0 11/ 9/56	--	Dom	
Sv 91	15V, 3.8N, 0.4W	Ace Fibre Mill	1956	560	Drl	90	6	--	Psg	5	60	Dom	
Sv 92	15V, 8.0N, 2.7E	Sullivan County Highway Products Corp.	1952	550	Drl	205	6	--	Psg	15	14	Ind	Screen 10 ft, setting unknown.
Sv 93	14U, 5.1S, 4.2W	Paul's Esso Station	1956	1,368	Drl	308	6	152	Du	150	14	Com	Supplies vehicle service station.
Sv 94	14U, 5.9S, 5.1W	E. Wells	1946	1,340	Drl	165	6	7	Du	19	2.5	Dom	Drawdown 136 ft when pumped at 2.5 gpm; duration of test not known.
Sv 95	14U, 5.9S, 5.1W	do.	1954	1,340	Drl	282	8	12	Du	60	22	Com	
Sv 96	14U, 7.5S, 3.8E	W. Chubin	1947	1,480	Drl	135	6	--	Du	16.0 11/21/56	17	Dom	
Sv 97	14U, 7.6S, 3.6E	Sungas Co.	1948	1,500	Drl	86	6	--	Du	15	25	Dom	
Sv 98	15V, 5.8N, 2.5W	H. Metzger	1955	1,440	Drl	50	6	6	Du	9	50	Dom	
Sv 99	15V, 0.4N, 3.3W	F. Grebeldinger, Jr.	1956	540	Drl	80	6	--	Psg	40	26	Dom	
Sv 100	15V, 0.1N, 3.0W	J. Sicuro	1956	515	Drl	195	6	135	Hs	25	20	Dom	(a) (b). Pumped at 20 gpm for 6 hours.
Sv 101	15U, 0.3N, 5.8E	L. Backus	1947	830	Drl	265	6	--	Du	200	11	Dom	
Sv 102	14T, 6.4N, 2.8E	Hill's Villa	1946	1,300	Drl	150	6	16	Du	30	35	Res	(a).
Sv 103	14T, 6.4N, 2.8E	do.	1950	1,300	Drl	125	6	12	Du	18	35	Res	
Sv 104	13T, 5.1S, 5.9E	T. P. Weeks	--	1,320	Drv	13	1.25	--	Psg	10	--	Dom	
Sv 105	15U, 2.7N, 3.6E	G. Dimock	1948	1,300	Drl	88	6	--	Du	15	10	Dom	
Sv 107	14U, 2.9N, 3.9W	N. Sherwood	1955	1,330	Drl	60	--	60	Pg	18	250	TW	(b). Drawdown 8 ft when pumped at 250 gpm; duration of test not known.
Sv 108	15U, 1.0S, 3.3W	Bellaire Country Club	--	1,400	Drl	250	6	--	Du	--	30	Res	Another well on property 150 ft deep reportedly yields 25 gpm. Both wells produce 10,000 gpd.
Sv 109	14U, 6.1S, 4.4W	E. Burton	--	1,360	Drl	462	6	6	Du	60.6 12/ 5/56	--	None	Water unusable; salty taste, hydrogen sulfide odor, yellowish color. Methane gas reported at 460 ft, salt water at 462 ft. Two gas explosions reported during drilling.
Sv 110	14U, 2.9N, 3.9W	N. Sherwood	1956	1,330	Drl	58	18	58	Pg	2.2 12/ 5/56	421	TW	(b). Screen 10 ft, setting unknown. Drawdown 49 ft when pumped at 900 gpm for 8 hours.
Sv 111	13U, 5.2S, 4.4E	New York City Board of Water Supply	1944	1,817	Drl	249	5-3	227	P and Du	--	--	TB	(b).
Sv 112	13U, 5.3S, 4.5E	do.	1944	1,812	Drl	270	5-3	249	P and Du	--	--	TB	(b).
Sv 113	13U, 5.4S, 4.6E	do.	1937	1,837	Drl	166	4	146	P and Du	--	--	TB	(b).
Sv 114	13V, 7.4S, 4.9W	do.	1944	1,612	Drl	743	3	13	P and Du	--	--	TB	(b).
Sv 115	13V, 8.1S, 5.0W	do.	1954	1,527	Drl	706	4	21	P and Du	--	--	TB	(b).
Sv 116	13U, 0.3N, 2.6W	do.	--	2,083	Drl	53	--	33	P and Du	--	--	TB	
Sv 117	13U, 0.2S, 2.2W	do.	--	1,883	Drl	41	--	20	P and Du	--	--	TB	
Sv 118	13U, 0.2S, 2.1W	do.	--	1,928	Drl	33	--	12	P and Du	--	--	TB	
Sv 119	13U, 6.0S, 1.4E	do.	1954	1,684	Drl	831	4	8	P and Du	--	--	TB	(b).

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 120	13U, 4.2S, 4.0W	New York City Board of Water Supply	1954	1,699	Drl	808	4	43	P and Du	--	--	TB	(b).
Sv 121	13U, 0.1N, 2.5W	do.	1944	1,583	Drl	157	5-3	137	P and Du	--	--	TB	(b).
Sv 122	13U, 0.1S, 2.4W	do.	1944	1,590	Drl	239	5-3	219	P and Du	--	--	TB	(b).
Sv 123	13U, 0.2S, 2.3W	do.	1937	1,597	Drl	208	4	188	P and Du	--	--	TB	(b).
Sv 124	13U, 3.6S, 2.4E	do.	1937	2,044	Drl	43	4	23	P and Du	--	--	TB	(b).
Sv 125	14U, 5.2N, 5.8E	do.	1929	1,275	Drl	161	4-2.5	140	P and Du	--	--	TB	(b).
Sv 126	14U, 3.3N, 4.0W	White Sulphur Springs Water District	1949	1,330	Drl	54	12	--	Psg	2	311	PS	(b). Screened from 44 to 54 ft. Drawdown 12 ft when pumped at 311 gpm.
Sv 127	14U, 3.3N, 4.0W	do.	1949	1,330	Drl	51	12	--	Psg	4	305	PS	(b). Screen 10 ft, setting unknown. Drawdown 6 ft when pumped at average rate of 260 gpm after 1½ hours.
Sv 128	14U, 2.6N, 3.6W	N. Sherwood	1955	1,340	Drl	55	8	--	Psg	12	--	TW	(b).
Sv 129	14U, 2.7N, 3.7W	do.	1955	1,330	Drl	67	8	67	Psg	14	--	TW	(b).
Sv 130	14U, 2.8N, 3.8W	do.	1955	1,330	Drl	39	8	39	Psg	1	--	TW	(b).
Sv 131	14U, 2.8N, 3.8W	do.	1955	1,330	Drl	58	8	58	Psg	0	250	TW	(b). Drawdown 24 ft when pumped at 250 gpm; duration of test not known.
Sv 137	13U, 5.5S, 4.9E	New York City Board of Water Supply	1944	1,881	Drl	966	3	20	Pd and Du	--	--	TB	(b).
Sv 138	14U, 4.9S, 1.5E	Kaufman	--	1,350	Drl	115	6	12	Du	50	32	Res	Wells Sv 138 - Sv 140 supply 150 people and swimming pool.
Sv 139	14U, 4.8S, 1.4E	do.	--	1,380	Drl	265	6	12	Du	50	32	Res	
Sv 140	14U, 5.0S, 1.5E	do.	1957	1,320	Drl	145	6	8	Du	13.7 6/ 7/57	50	Res	
Sv 141	14U, 3.8S, 1.6E	C. Vernoy	--	1,340	Dug	19	36	--	Pt	13.4 6/ 7/57	--	Dom, Stock	Temperature 44°F, 6/7/57. Formerly used to supply water for 1,000 chickens.
Sv 142	14U, 3.6S, 1.5E	Ernhouts	1956	1,320	Drl	75	6	--	Du	--	--	Dom, Stock	
Sv 143	14U, 3.8S, 2.4E	N. Levine	1950(?)	1,420	Drl	50	6	7	Du	2	24	Dom, Stock	Supplies home and 12,000 chickens. Well flows during wet periods.
Sv 144	14U, 5.4S, 3.6E	I. Fradkin	1938	1,420	Drl	214	6	20	Du	--	45	Res	Supplies 50 people during summer.
Sv 145	14U, 3.1S, 2.5E	F. Promowitz	1946	1,580	Drl	300	6	--	Du	--	43	Res	Supplies 20 people during summer.
Sv 146	14U, 4.4S, 3.9E	A. Drobysk, Jr.	1949(?)	1,480	Drl	400	6	50	Du	110	9	Dom	When 257 ft deep did not yield sufficient water.
Sv 147	14U, 3.8S, 3.8E	Harmony Country Club	1955(?)	1,590	Drl	550	4	8	Du	200	22	Res	Supplies up to 200 people in summer. Well originally was 200 ft deep; was drilled deeper for more water.
Sv 148	14U, 2.5S, 3.6E	I. Glazer	1957	1,530	Drl	230	6	--	Du	100	25	Dom, Stock	Supplies home and mink farm.
Sv 149	14U, 2.1S, 3.2E	Hotel Majestic	1951	1,580	Drl	375	6	--	Du	50	18	Res	
Sv 150	14U, 2.4S, 2.5E	Kashnick	1948(?)	1,450	Drl	350	6	--	Du	--	6	Res	Supplies up to 60 people in summer.
Sv 151	14U, 2.0S, 2.1E	F. Herzog	--	1,190	Dug	15	--	--	Psg	13.4 6/ 7/57	--	None	Abandoned.
Sv 152	14U, 3.0S, 1.9E	M. Friedman	1952	1,400	Drl	180	6	70	Du	--	--	Dom	Supplies three houses.
Sv 153	14U, 1.5S, 1.1E	M. Cohen	1946	1,265	Drl	285	5	35	Du	50	40	Dom	Supplies seven houses.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 154	14U, 0.5S, 0.8E	L. Ackerman	1932	1,345	Drl	195	6	--	Du	--	--	Res	Supplies 50 people in summer. Well flows during wet weather.
Sv 155	14T, 5.5N, 1.8W	J. A. Weiland	prior to 1900	1,600	Dug	7	36	--	Pt	5.1 6/10/57	--	Dom	Temperature 56°F, 6/10/57.
Sv 156	14T, 3.2N, 0.5W	S. Peters	1953	940	Drl	168	6	120	Du	12	15	Dom	Supplies three families.
Sv 157	14T, 1.0N, 1.5W	B. Robish	1935(?)	800	Drv	14	2	--	Psg	10	--	Dom	
Sv 158	14T, 3.8N, 1.6W	E. Hess	1952	1,430	Drl	80	6	15	Du	15	7	Dom, Stock	
Sv 159	14T, 1.3N, 4.8W	Schlegl	1954	770	Drl	152	6	--	Du	--	30	Dom	Water reported cloudy, grayish color.
Sv 160	14T, 2.4N, 5.3W	E. Curtis	1957	770	Drv	20	1.5	--	Pg	16.4 6/10/57	--	Dom	Not in use 6/10/57.
Sv 161	14T, 7.8N, 2.1W	Freidenstine	1940	1,530	Drl	310	6	--	Du	160	35	Dom, Stock	Supplies 2 houses and 70 cows.
Sv 162	14T, 8.8N, 0.6W	C. Kellam	1926	1,810	Dug	14	36	--	Pt	6	--	Dom, Stock	Supplies 30 cows.
Sv 163	14T, 8.4N, 1.4W	Crystal Lake Camp	1941	1,725	Drl	450	6	--	Du	15	--	None	
Sv 164	14T, 7.1N, 0.8W	W. Herbert	--	1,580	Drl	285	6	--	Du	2	--	Dom, Stock	Temperature 51°F, 6/11/57. Supplies 30 cows and 40 chickens.
Sv 165	14T, 6.4N, 0.2W	C. Deckelman	1951	1,685	Drl	267	6	15	Du	--	5	Dom	
Sv 166	14T, 7.1N, 0.2W	F. Haefner	1955	1,600	Drl	100	6	--	Du	60	--	Dom	
Sv 167	14T, 6.1N, 3.4W	A. Meyer	--	1,070	Dug	13	36	--	Pt	11	--	Dom	
Sv 168	14T, 4.7N, 2.7W	F. Graby	late 1800's	1,430	Drl	39	3	20	Du	33	--	Dom	Water reported to leave rusty stain.
Sv 169	14T, 6.9N, 3.3W	Sausmikat	1926(?)	1,460	Drl	310	6	--	Du	142	--	Dom, Stock	Supplies 22 cows.
Sv 170	14T, 5.7N, 4.4W	J. Schmeling	1800's	960	Dug	60	36	--	Psg	9	--	Dom	
Sv 171	14T, 4.8N, 4.8W	M. Sator	1950	820	Drv	26	1.5	--	Psg	--	--	Dom	
Sv 172	14T, 4.8N, 4.8W	--	1956	820	Dug	13	36	--	Psg	8.9 6/12/57	--	None	
Sv 173	14T, 7.5N, 5.4W	A. Daniels	--	930	Drv	25	2	--	Psg	9	--	Dom	
Sv 174	13T, 7.9S, 0.3E	McCausland	1939	2,180	Drl	300	6	--	Du	--	--	Dom	
Sv 175	13T, 7.5S, 0.9E	Reiping's Lodge	1956	1,960	Drl	268	6	120	Du	20	35	Res	Supplies 200 people.
Sv 176	13T, 7.8S, 1.7E	Tennanah Lake House	1953(?)	2,210	Drl	665	8	87	Du	183	120	Res	Supplies 600 people. Temperature 47°F, 6/14/57.
Sv 177	13T, 7.4S, 2.9E	J. Bowers	1953	2,120	Dug	25	36	--	Pt	19	--	Dom	Till reported to contain layers of sand and gravel.
Sv 178	13T, 6.7S, 2.7E	Marian Gables Lodge	1953	1,990	Drl	300	6	15	Du	150	23	Res	
Sv 179	15V, 4.7N, 2.0E	H. C. Rink	1957	980	Drl	65	6	28	HR	25	30	Dom	Drawdown 15 ft when pumped at 30 gpm for 2 hours.
Sv 180	13U, 3.7S, 4.4W	Mountain Crest Lodge	1935	1,905	Drl	300	6	--	Du	100	22	Res	Supplies 150 people.
Sv 181	13U, 0.6S, 3.2W	T. Willeck	1945	1,560	Drv	12	2	--	Psg	8	--	Dom	
Sv 182	13U, 4.8S, 3.4W	R. Ram	1950	1,980	Drl	400	6	100	Du	200	20	Res	Drilled well 375 ft deep and unused dug well 17 ft deep nearby. Drilled wells supply bungalow colony. Depth to water in dug well 3.1 ft below land surface, 6/14/57.
Sv 185	13U, 5.2S, 2.7W	Trojan Lake Lodge	1947(?)	2,160	Drl	460	6	--	Du	250	8	Res	Water from nearby lake used for sanitary facilities.
Sv 186	13U, 4.5S, 2.0W	White Roe Lake Resort	1945	2,220	Drl	750	8	160	Du	--	45	Res	Water from well reported cloudy at times.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 187	13U, 4.1S, 1.1W	J. J. Reilly	1957	1,900	Dug	11	36	--	Ps	8.2 6/17/57	--	Dom	Temperature 49°F, 6/17/57. Well in process of construction at time of survey.
Sv 188	13U, 8.6S, 1.0W	Moskowitz	1948(?)	2,100	Drl	288	6	100	Du	65	21	Dom, Stock	
Sv 189	13U, 7.2S, 5.7W	E. Schliermacher	1943	2,110	Drl	128	6	--	Du	--	56	Dom, Stock	Supplies 26 cows. Well initially drilled to depth of 85 ft. Water leaves rusty stain.
Sv 190	13U, 6.3S, 4.4W	A. Edwards	--	1,400	Dug	12	20	--	Psg	8	--	Dom	
Sv 191	13U, 3.9S, 6.5W	K. Stewart	1953	1,910	Drl	325	6	66	Du	265	15	Dom, Stock	Supplies 15 cows.
Sv 192	13U, 3.5S, 5.9W	Scholey	1800's	1,980	Dug	25	36	--	Pt	15	--	Dom	
Sv 194	13U, 1.7S, 5.6W	J. Marble	1949	1,480	Drl	192	6	--	Du	3.0 6/18/57	--	None	Drilled inside dug well 6.5 ft deep. Water level in dug well 2.8 ft below land surface, 6/18/57. Yield inadequate.
Sv 195	13T, 3.2S, 4.8E	G. Edwards	--	1,305	Drv	22	1.25	--	Psg	19	--	Dom	Well originally 12 ft deep. Owner reports that water level fell when nearby river was deepened. Well was then driven to present depth.
Sv 196	13T, 4.3S, 3.8E	A. Onken	--	1,290	Dug	10	72	--	Psg	5	--	None	Water reported to leave rusty stain.
Sv 197	13T, 4.8S, 3.8E	H. Merrill	1939	1,420	Drl	150	6	10	Du	20	20	Dom	
Sv 198	13T, 6.4S, 1.6E	J. Milczynski	1954	2,045	Drl	356	6	12	Du	9	20	Dom	Well occasionally flows during wet weather.
Sv 199	13T, 7.1S, 4.0E	F. Wegman	--	2,020	Dug	20	36	--	Pt	18	--	Dom	Owner reports well goes dry about every other summer.
Sv 200	13T, 7.6S, 5.8E	M. Butler	1920's	2,010	Dug	7	48	--	Pt	1.0 6/18/57	--	Dom	Temperature 52°F, 6/18/57.
Sv 201	13U, 8.5S, 3.0W	C. Barber	1946	1,470	Dug	20	36	--	Psg	12	--	Dom	Owner reports well almost dry in 1953.
Sv 202	14U, 6.8N, 3.1W	E. Muller	1948(?)	1,870	Drl	95	6	--	Psg	--	--	Dom	Supplies two houses.
Sv 203	14U, 5.9N, 3.6W	S. Lewis	1951	1,910	Drl	93	6	75	Du	30	5	Dom	
Sv 204	14U, 2.1N, 4.7W	H. Hector	early 1900's	1,480	Dug	22	36	--	Pt	9.7 6/19/57	--	Dom	
Sv 205	14U, 1.0N, 6.0W	W. Judson	--	1,230	Dug	32	48	--	Pt	16	--	None	Has supplied 30 cows.
Sv 206	14U, 1.9N, 0.6W	Orchard House	--	1,680	Dug	20	36	--	Pt	16	--	None	
Sv 207	14U, 2.1N, 1.4W	F. Simon	1955	1,630	Drl	350	6	50	Du	20	60	Swimming pool	
Sv 208	14U, 1.0N, 2.3W	Swan Lake Mansion	1955	1,340	Drl	303	8	40	Du	4	70	Res	Supplies 250 people. Cased to 80 ft.
Sv 209	14U, 4.5N, 0.9W	J. Williams	--	1,910	Dug	28	36	--	Pt	11.0 6/19/57	--	None	Yield inadequate.
Sv 210	14U, 5.5N, 2.9W	G. Barnhart	1956	2,090	Drl	282	6	2	Du	20	--	Dom	
Sv 211	14U, 4.7N, 3.6W	W. Kline	1930's	1,640	Drl	250	6	12	Du	10	--	Dom, Stock	
Sv 212	14U, 7.2N, 2.4W	Jakubwicz	1954	1,940	Drl	273	6	6	Du	60	2	Dom, Stock	Supplies 7,000 chickens.
Sv 213	14U, 5.3N, 0.6W	M. Levy	1954(?)	2,100	Drl	147	6	14	Du	--	9	Dom	
Sv 214	14U, 6.3N, 0.1W	Goldman Bros.	1939	1,900	Drl	234	6	55	Du	100	5	Dom, Stock	Supplies 20 cows.
Sv 215	14U, 8.7N, 2.4W	V. Augustine	1953	1,540	Drl	111	6	65	Du	3	8	Com	Supplies motor vehicle service station.
Sv 216	14T, 8.2N, 6.3E	The Waverly	1957	2,100	Drl	200	6	22	Du	--	--	Res	

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 217	14T, 4.3N, 6.0E	E. Boxberger	1942	1,210	Dug	12	24	--	Psg	11.0 6/20/57	--	Dom	
Sv 218	14T, 1.9N, 5.1E	Perres Poultry Farm	1950	1,130	Drl	276	6	225	Du	12	25	Dom, Stock	Chicken farm.
Sv 219	14T, 0.7N, 4.9E	W. Nakas	--	1,470	Dug	35	36	--	Pt	13.4 6/20/57	--	Dom	
Sv 220	14T, 1.0N, 6.3E	--	1877	1,180	Dug	18	36	--	Psg	6.6 6/20/57	--	None	Well at site of destroyed house.
Sv 221	14T, 2.5N, 6.0E	Reimsnyder	--	1,400	Dug	14	36	--	Pt	10.6 6/20/57	--	Dom	Well pumped heavily just prior to water-level measurement.
Sv 222	14U, 3.9N, 6.6W	E. Graf	--	1,550	Drl	139	6	--	Du	89	--	Dom	
Sv 223	14U, 4.3N, 5.8W	Kraemer's Union House	1942(?)	1,320	Drl	202	6	20	Du	4	15	Res	Supplies 120 people.
Sv 224	14U, 3.1N, 5.5W	K. Schminke	--	1,390	Dug	15	36	--	Pt	9.4 6/20/57	--	Dom	Reported to go dry during most summers.
Sv 225	14U, 2.3N, 6.0W	W. Leschorn	1800's	1,270	Dug	20	36	--	Pt	10	--	Dom	
Sv 226	14U, 6.8N, 5.9W	Dovin's Resort	1947	2,140	Drl	420	6	4	Du	315	5	Res	Supplies 30 people. Water contains hydrogen sulfide. New drilled well nearby 130 ft deep not yet in use.
Sv 228	14U, 8.0N, 5.4W	J. Fischer	1953	1,890	Drl	112	6	15	Du	7	20	Dom	
Sv 229	13U, 8.6S, 5.5W	J. C. Lyman	1956	1,890	Drl	212	6	20	Du	--	7	Dom	
Sv 230	13U, 8.4S, 6.3W	C. Temple	1932	1,970	Dug	23	36	--	Pt	5.0 6/21/57	--	Dom	Dry in 1953. Temperature 46°F, 6/21/57. Another dug well 18 ft deep nearby.
Sv 232	14T, 3.8N, 0.1E	Ockelman	early 1900's	1,025	Dug	25	72	--	Psg	11	--	Dom	Temperature 52°F, 6/21/57.
Sv 233	14T, 5.2N, 0.6E	H. Hust	1955	1,200	Drl	182	6	130	Du	flows	0.5 (flow)	Stock	
Sv 235	14T, 2.6N, 2.4E	Sunrise House	1952	1,340	Drl	285	6	25	Du	60	15	Res	Another drilled well, 185 ft deep, nearby. Both wells supply 45 people in summer.
Sv 236	14T, 0.6N, 3.9E	A. Thony	1955	1,270	Drl	210	6	--	Du	45	6	Dom, Stock	Supplies 400 chickens and 18 cows.
Sv 237	14T, 0.2N, 2.5E	E. Berg	--	1,030	Drl	200	4	0	Du	--	--	Dom	
Sv 238	14T, 0.6N, 1.8E	F. Glassel	1939	1,365	Drl	320	6	--	Du	12	9	Dom, Stock	Supplies 15 cows.
Sv 239	14T, 0.4N, 0.8E	G. Cummings	1945(?)	1,310	Drl	154	6	12	Du	25	20	Dom	
Sv 240	14T, 1.6N, 1.7E	B. Soloway	1945	1,380	Drl	220	6	--	Du	--	--	Dom	
Sv 241	14T, 6.8N, 2.4E	E. Earlwein	1955	1,540	Drl	225	6	--	Du	--	--	Dom	
Sv 242	13T, 8.9S, 1.0E	Camperlengo	--	2,080	Dug	27	36	--	Pt	3.3 6/25/57	--	None	
Sv 243	14T, 7.4N, 0.3E	J. Schilling	--	1,880	Dug	9	36	--	Pt	3.3 6/25/57	--	Stock	Reportedly goes dry in late summer. Supplies five cows. Temperature 50°F, 6/25/57.
Sv 244	14T, 4.1N, 3.1E	C. Kantz	1800's	1,630	Dug	15	36	--	Pt	7	--	None	
Sv 245	14T, 4.6N, 4.9E	F. Eagin	1949	1,570	Drl	196	6	--	Du	--	13	Dom, Stock	Supplies 40 cows.
Sv 246	14T, 7.7N, 4.7E	R. Wehner	1957	1,880	Drl	124	6	52	Du	30	15	Dom, Stock	Supplies 22 cows and 600 chickens.
Sv 247	14T, 8.3N, 5.5E	High View Lodge	--	2,020	Drl	160	6	20	Du	--	20	Res	Supplies 50 people.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 248	13T, 8.5S, 5.3E	J. Wojtowicz	early 1900's	1,990	Dug	12	36	--	Pt	1.6 6/25/57	--	None	Temperature 48°F, 6/25/57.
Sv 249	14U, 2.3N, 1.8E	Reitzen	early 1900's	1,410	Dug	6	48	--	Pt	5.1 6/26/57	--	None	
Sv 250	14U, 2.1N, 3.2E	M. Hausen	1932	1,460	Drl	125	6	--	Du	--	--	Dom	Reported to flow much of the time, but not flowing at time of survey, 6/26/57. Water reddish unless filtered.
Sv 251	14U, 2.0N, 4.8E	Capital Hotel and Camp	1931	1,520	Drl	307	6	15	Du	40	11	Res	
Sv 252	14U, 1.1N, 5.4E	Woodview Inn	1938	1,410	Drl	210	6	20	Du	25	--	Res	Water level reported to rise occasionally to 6 ft below land surface. Unused dug well 11.5 ft deep nearby. Water level in dug well 8.4 ft below land surface, 6/26/57.
Sv 254	14U, 1.1N, 6.5E	P. Bernard	1951	1,400	Drl	100	6	--	Du	10	7	Dom, Com	Supplies motor vehicle service station.
Sv 255	14V, 1.2N, 3.4W	Schwartz Sky House	1954	1,360	Drl	320	6	70	Du	90	17	Res	Water leaves reddish stain. Another well drilled 150 ft deep, nearby; reportedly flows during winter.
Sv 257	14V, 3.2N, 4.2W	L. Roosa	1948	1,400	Drl	51	6	10	Du	5	22	Dom	
Sv 258	14U, 3.2N, 4.5E	Millstein & Ganz Poultry Farm	1950	1,600	Drl	250	6	40	Du	--	9	Dom, Stock	Supplies 55,000 chickens.
Sv 259	14U, 2.8N, 5.6E	J. Rosen	1944(?)	1,460	Dug	15	48	7	Du	2	--	Dom	
Sv 260	14U, 3.7N, 3.4E	D. McIntosh	--	1,470	Dug	16	36	16	Pt	9.0 6/26/57	--	Dom	Temperature 53°F, 6/26/57.
Sv 261	14U, 5.2N, 3.7E	J. Hartman	1953	1,600	Drl	110	6	35	Du	60	5	Dom	Supplies two houses.
Sv 262	14U, 5.0N, 2.4E	Kee	--	1,640	Dug	20	36	--	Pt	3	--	Dom	
Sv 263	13U, 5.1S, 0.6E	W. Lachick	--	2,090	Dug	19	36	--	Pt	3.6 6/27/57	--	Dom	
Sv 264	13U, 4.8S, 2.8E	P. Terwilliger	1922	2,320	Drl	100	6	5	Du	40	--	Dom	
Sv 265	13U, 4.9S, 2.6E	do.	1800's	2,330	Dug	11	36	11	Pt	3.9 6/27/57	--	None	
Sv 266	14U, 7.8N, 2.7E	Camp Kewanee	--	1,960	Drl	180	6	2	Du	--	--	Res	
Sv 267	14U, 7.1N, 3.3E	J. Muthig	--	1,730	Dug	20	36	--	Pt	10	--	Dom	
Sv 268	14U, 7.9N, 4.6E	O. Lowitz	1953	1,460	Drl	91	6	43	Du	--	6	Dom	
Sv 269	14U, 5.9N, 1.7E	M. Werbins	1940	1,820	Drl	203	6	--	Du	--	27	Res	
Sv 270	14U, 6.6N, 1.3E	B. Lanzman	1942	2,020	Drl	220	4	--	Du	--	12	Res	Supplies 200 people.
Sv 271	14U, 4.2N, 0.5E	P. E. Morgans	1948(?)	1,440	Dug	8	36	--	Psg	6.1 6/28/57	--	Dom	
Sv 272	14U, 5.6N, 1.2E	Clearview Manor	1949	1,700	Drl	324	6	--	Du	90	--	Res	
Sv 273	14U, 8.5N, 2.0E	N. Englehardt	1942	1,940	Drl	80	6	--	Du	5	25	Res	Supplies bungalow colony of 10 families.
Sv 274	13U, 7.8S, 2.9E	M. Bivins	1957	2,100	Dug	7	48	5	Du	5.0 6/28/57	--	Dom	
Sv 275	13U, 7.6S, 4.1E	C. Hotely	early 1900's	2,190	Dug	16	36	--	Pt	6.5 6/28/57	--	Dom, Stock	Temperature 52°F, 6/28/57.
Sv 276	13U, 6.6S, 2.3E	A. H. Wolf	--	2,150	Drl	177	6	--	Du	18.5 6/28/57	--	None	Dug well 18.5 ft deep nearby; water level 12.6 ft below land surface; temperature 47°F, 6/28/57.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 278	13U, 7.7S, 5.4E	Stevenson	--	2,000	Dug	30	36	--	Pt	24	--	Dom	
Sv 279	13V, 5.6S, 3.2W	R. Moore	1930	1,650	Drv	20	1.75	--	Psg	12	2	Dom	
Sv 280	13V, 6.4S, 4.0W	L. Gardepe	1945(?)	1,600	Drv	12	1.25	--	Psg	9	--	Dom	Reportedly went dry in 1955.
Sv 281	14U, 7.0N, 6.5E	Hilson	1957	1,600	Drl	252	6	--	Du	50	--	None	
Sv 282	14T, 0.2S, 2.0E	Osterout	early 1930's	1,000	Drl	204	6	--	Du	flows	--	Dom, Stock	Supplies 30 cows.
Sv 283	14T, 0.5S, 1.0E	F. Wachter	1952	1,100	Drl	80	8	4	Du	10	4.5	Dom	
Sv 284	14T, 1.3S, 0.1E	A. Rosenburger	1953	980	Dug	5	36	--	Pt	1.9 7/ 2/57	--	Dom	Well developed at site of former spring. Well goes dry in dry summers.
Sv 285	14T, 1.4S, 1.1E	C. Reum	1947	960	Drl	118	6	30	Du	50	--	Dom	
Sv 287	14T, 2.2S, 1.1W	A. Sauer	1938	1,260	Drl	219	4.5	--	Du	20	5	Dom, Stock	Supplies 10 cows, 600 chickens.
Sv 288	14T, 2.9S, 2.1W	F. Catalano	--	1,100	Dug	9	36	--	Pt	6.4 7/ 2/57	--	Dom	Temperature 54°F, 7/2/57.
Sv 289	14T, 1.2S, 2.2W	T. Bennedum	1957	1,030	Drl	208	6	9	Du	15	7.5	Com	Supplies restaurant and motor vehicle service station. Well reportedly penetrated "pocket" of natural gas.
Sv 290	14T, 4.9S, 1.3W	W. H. Keesler, Jr.	1951	1,000	Drl	252	6	8	Du	--	20	Dom, Stock	Supplies 1,000 chickens.
Sv 291	14T, 0.2S, 4.0E	J. Gran	1939	1,370	Drl	169	6	80	Du	--	--	Dom, Stock	Supplies 32 cows.
Sv 292	14T, 0.7S, 4.8E	H. A. Behr	--	1,340	Dug	42	48	--	Pt	3.1 7/ 3/57	--	Dom	Temperature 55°F, 7/3/57.
Sv 293	14T, 1.2S, 5.0E	do.	1940	1,240	Drl	148	6	0	Du	20	10	Dom	
Sv 294	14T, 0.6S, 6.4E	W. Michel	1944	1,320	Drl	126	6	50	Du	16	30	Dom, Stock	
Sv 295	14T, 3.3S, 6.4E	J. Starr	1907(?)	1,340	Dug	19	48	--	Pt	8.0 7/ 3/57	--	Dom	Sand at bottom of well.
Sv 296	14U, 4.8S, 5.8W	R. Tuff	1955	1,300	Drl	285	6	--	Du	30	--	Dom, Stock	Supplies 20 cows.
Sv 297	14T, 4.5S, 6.2E	N. B. Brown	--	1,330	Dug	21	36	--	Pt	12.7 7/ 3/57	--	None	
Sv 298	14T, 2.9S, 5.4E	H. Neill	1955	1,380	Drl	187	6	12	Du	20	20	Dom, Stock	Supplies 50 cows. Dug well 28.5 ft deep nearby. Water level in dug well 11.2 ft, temperature 52°F, 7/3/57.
Sv 300	14T, 4.0S, 5.3E	M. Panchyshyn	1953	1,355	Drl	206	6	--	Du	17	--	Dom	Dug well 28 ft deep nearby. Water level in dug well 5.6 ft below land surface, temperature 53°F, 7/3/57.
Sv 302	14T, 3.6S, 4.5E	R. Theis	1955	1,275	Drl	171	6	30	Du	--	11	Dom	
Sv 303	14T, 4.0S, 3.6E	E. Nearing	--	1,180	Dug	25	36	--	Pt	12	--	Dom	
Sv 304	14T, 3.7S, 2.4E	L. Phillips	--	1,280	Dug	16	36	15	Pt	4.4 7/ 4/57	--	Dom	Temperature 52°F, 7/4/57. Unused drilled well 142 ft deep nearby.
Sv 306	14T, 3.1S, 1.7E	C. Morgan	--	1,270	Dug	18	36	--	Pt	9.3 7/ 4/57	--	Dom	Temperature 54°F, 7/4/57.
Sv 307	14T, 3.0S, 3.0E	H. Lux	1947	1,360	Drl	175	6	--	Du	50	25	Dom, Stock	Supplies 2,000 chickens.
Sv 308	14T, 2.4S, 2.3E	A. Mueller	1953	1,335	Drl	140	6	2	Du	60	5	Dom	
Sv 309	14T, 3.9N, 0.4E	F. Kalbe	--	1,020	Drv	25	1.5	--	Psg	15	--	Dom	

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 310	13U, 8.5S, 1.0E	R. Mullen	1932	2,160	Drl	320	6	--	Du	28	--	Dom, Stock	
Sv 311	13U, 8.6S, 1.5E	A. Hodus	1957	2,080	Drl	157	4	--	Du	--	20	Res	Supplies six families and swimming pool.
Sv 312	14U, 0.6S, 0.9W	L. Cole	1954(?)	1,405	Drl	242	4	--	Du	--	40	Dom	
Sv 313	14U, 0.1N, 0.3W	G. R. James	1852	1,425	Dug	31	24	--	Pt	21	--	Dom	
Sv 314	14U, 1.9S, 0.1W	J. Meltzer	1950	1,280	Drl	201	6	--	Du	--	6	Dom, Stock	Supplies 2,500 chickens.
Sv 315	14U, 2.4S, 0.3W	J. & F. Kauleski	1937(?)	1,325	Drl	265	6	22	Du	20	16	Res	Supplies three houses.
Sv 316	14U, 4.7S, 0.1W	Cedeira	1951	1,340	Drl	190	6	--	Du	--	--	Dom	Supplies two houses.
Sv 317	14U, 5.6S, 0.8W	I. Krieger	1946	1,280	Drl	263	6	--	Du	15	25	Res	Supplies 16 families.
Sv 318	14U, 3.7S, 3.8W	A. Hurd Estate	--	1,275	Dug	30	36	30	Pt	20	--	Dom	
Sv 319	14U, 2.0S, 3.6W	A. Misuer	1947	1,320	Drl	50	6	19	Du	--	20	Dom, Stock	Supplies 13 cows.
Sv 320	14U, 0.9S, 3.3W	W. McIntyre	--	1,430	Dug	20	36	--	Pt	19	--	Dom	Reportedly goes dry every summer.
Sv 321	14U, 2.3W	L. Abramowitz	1954	1,400	Drl	187	4	20	Du	--	25	Res	Supplies 10 houses and swimming pool.
Sv 322	14U, 1.6S, 2.5W	Goldwasser's Bungalows	1952	1,260	Drl	317	6	107	Du	--	25	Res	Supplies 28 families.
Sv 323	14U, 2.3S, 2.7W	M. Furman	1956	1,280	Drl	300	6	11	Du	75	35	Res	Supplies 15 families and store.
Sv 324	14U, 3.4S, 2.7W	F. Grabek	1800's	1,400	Dug	9	36	--	Pt	3.7 7/ 8/57	--	Dom, Stock	Supplies 700 chickens. Temperature 55°F, 7/8/57.
Sv 325	14U, 5.2S, 2.4W	Roth's Farm House	1941	1,190	Drl	135	6	35	Du	--	16	Res	
Sv 326	14U, 4.6S, 1.3W	H. O'Dell	--	1,120	Dug	22	36	--	Psg	14.9 7/ 8/57	--	Dom	Temperature 55°F, 7/8/57.
Sv 327	14U, 3.5S, 1.2W	F. J. Quigan	1800's	1,245	Dug	40	36	--	Pt	20	--	None	
Sv 328	14U, 2.2S, 1.3W	H. Burns	1945	1,380	Drl	208	6	--	Du	30	7	Dom, Stock	Supplies 50 cows.
Sv 329	14U, 1.5S, 1.8W	L. Bauman	1944	1,360	Drl	295	6	20	Du	--	15	Res	Supplies 26 families.
Sv 330	14U, 0.5S, 1.3W	S. Ginenthal	1956	1,405	Drl	302	6	22	Du	90	10	Dom	
Sv 331	14U, 0.2S, 4.2W	F. Haddock	--	1,460	Dug	13	30	--	Pt	9.2 7/ 9/57	--	Dom	Yield inadequate in summer. Temperature 55°F, 7/9/57.
Sv 332	14U, 1.0S, 4.7W	C. McKay	1935	1,380	Dug	21	30	10	Du	17.7 7/ 9/57	--	Dom	Temperature 54°F, 7/9/57.
Sv 333	14U, 1.8S, 5.0W	E. Wlodarski	--	1,835	Dug	22	36	21	Pt	20	--	Dom	Reportedly goes dry most summers.
Sv 334	14U, 2.3S, 4.4W	J. Barber	1956	1,305	Drl	128	6	25	Du	30	25	Dom	
Sv 335	14U, 3.6S, 5.3W	I. Shapiro	1937	1,430	Drl	352	6	--	Du	--	25	Dom	Supplies five houses.
Sv 336	14U, 2.5S, 5.6W	C. Specht	1940	1,460	Drl	446	6	40	Du	90	11	Dom	
Sv 337	14U, 0.6S, 5.7W	I. Goldstein	1942	1,465	Drl	220	6	20	Du	70	5	Dom, Stock	Chicken farm.
Sv 338	14U, 1.4S, 5.9W	do.	1948	1,460	Drl	400	4	25	Du	65	3	Dom	
Sv 339	14U, 0.3S, 6.3W	K. & L. Laird	1800's	1,340	Dug	18	30	--	Pt	6.9 7/ 9/57	--	Dom, Stock	Temperature 57°F, 7/9/57. Supplies seven cows.
Sv 340	14U, 3.8S, 5.9W	A. Dubin	1947	1,340	Drl	242	6	60	Du	45	30	Res	Supplies 15 families.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 341	14U, 7.1S, 6.1W	H. Bressler	1953	1,325	Drl	130	8	30	Du	--	18	Dom	
Sv 342	14U, 6.1S, 6.4W	E. Lily	1946(?)	1,300	Drl	182	6	--	Du	47	6	Dom, Stock	
Sv 343	14T, 5.2S, 6.6E	G. Misner	1936	1,290	Dug	25	48	--	Pt	22.2 7/10/57	--	Dom	Reportedly goes dry every summer. Temperature 54°F, 7/10/57.
Sv 344	14T, 5.0S, 5.2E	E. Hendrix	1941	1,390	Drl	344	6	2	Du	100	6	Dom	
Sv 345	14T, 5.3S, 4.1E	C. Smith	1950	1,225	Drl	155	6	20	Du	40	6	Dom, Stock	Supplies 15 cows, 200 chickens.
Sv 346	14T, 4.0S, 1.0E	H. Diehl Estate	1924(?)	1,260	Drl	120	6	60	Du	--	--	Dom	
Sv 347	14T, 4.7S, 0.2W	J. Kraack	--	1,275	Dug	13	36	--	Pt	4	--	Dom	
Sv 348	14T, 5.5S, 3.0W	J. J. Hull	1954	770	Drl	55	6	2	Du	2	3	Dom	Reportedly flows during periods of very high water levels.
Sv 349	14T, 6.0S, 2.6W	F. A. Vaughn	1948	960	Drl	297	6	22	Du	150	4.5	Com	Supplies motor vehicle service station.
Sv 350	14T, 7.0S, 2.5W	L. Campfield	1946	935	Drl	335	6	2	Du	80	--	Dom	
Sv 351	14T, 7.0S, 1.0W	A. Zink	--	1,205	Dug	25	36	--	Pt	19	--	Dom	Reportedly went dry in 1951.
Sv 352	14T, 7.1S, 0.2W	H. Sewing	1955	1,180	Drl	195	6	17	Du	10	20	Dom, Stock	
Sv 353	14T, 7.7S, 0.2E	E. J. Moran	1947	980	Drl	119	4	20	Du	--	5	Dom	
Sv 354	14T, 8.3S, 0.2W	C. Goelz	--	970	Dug	17	36	--	Pt	11.5 7/10/57	--	Dom	Temperature 51°F, 7/10/57.
Sv 355	15T, 8.5N, 0.7W	G. Schlirer	--	1,220	Drl	125	6	--	Du	20	--	Dom	
Sv 356	14T, 8.4S, 1.2W	G. Mackle	1800's	1,170	Dug	13	36	--	Pt	8	--	Dom	
Sv 357	14T, 8.4S, 2.2W	W. Keesler	--	840	Dug	14	48 (square)	12	Pt	7.4 7/11/57	--	Com	Temperature 50°F, 7/11/57. Supplies motor vehicle service station.
Sv 358	15T, 8.3N, 2.1W	C. Naber	1956	780	Drl	200	6	--	Psg	60	--	Dom	
Sv 359	15T, 8.1N, 3.0W	J. Bartelme	1949	770	Drl	200	6	60	Du	70	--	Com	Supplies motor vehicle service station.
Sv 360	15T, 6.9N, 2.5W	A. Paul	1943	790	Drl	165	6	70	Du	90	6	Dom	
Sv 361	15T, 7.4N, 2.1W	A. Hiller	1955	940	Drl	149	6	15	Du	29	5	Dom	
Sv 362	15T, 6.5N, 1.4W	E. Stegensek	1945	1,200	Drl	217	6	20	Du	--	20	Dom	
Sv 363	15T, 6.3N, 0.7W	Hill's Lakeside Lodge	--	960	Dug	10	36	--	Pt	2.9 7/11/57	--	None	
Sv 364	15T, 8.3N, 2.5E	L. Kuen	--	1,030	Drv	34	1.25	--	Psg	15	--	Dom, Stock	
Sv 365	14T, 7.9S, 0.7E	A. Strassel	1933	1,180	Drl	152	6	8	Du	6	3	Dom	Supplies two houses.
Sv 366	14T, 7.5S, 1.6E	J. Meyer	--	1,250	Drl	200	6	--	Du	100	8	Dom, Stock	Supplies 2 houses and 20 cows. Dug well, 9.5 ft deep nearby; water level 5.2 ft below land surface, 7/11/57; temperature 59°F, 7/11/57.
Sv 368	14T, 6.8S, 2.5E	J. Rueckert	1948	1,080	Drl	160	6	12	Du	20	--	Dom	
Sv 369	14T, 6.3S, 2.0E	E. Dailey	1955	1,040	Drl	87	6	18	Du	11	8	Dom	Supplies two houses.
Sv 370	14T, 4.6S, 1.5E	W. Gasko	1948	1,120	Drl	120	6	--	Du	--	3	Dom, Stock	Supplies 25 cows.
Sv 371	14T, 5.6S, 0.6E	A. Rubinstein	1946	1,195	Drl	140	6	--	Du	20	7	Dom	
Sv 372	14T, 6.5S, 0.7E	J. B. Maas	1940	1,020	Drl	98	6	32	Du	30	22	Dom	

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 373	15T, 7.7N, 4.1E	P. Bichette	1931	1,240	Drl	135	6	40	Du	15	10	Dom	Dug well 15 ft deep in sand and gravel nearby. Depth to water reportedly 7 ft below land surface in dug well.
Sv 375	15T, 6.3N, 3.0E	A. Ness	1942	1,300	Drl	210	6	65	Du	13	40	Dom	
Sv 376	15T, 7.1N, 3.7E	B. Zaccari	--	1,305	Dug	10	48	--	Pt	7.3 7/12/57	--	Dom	Temperature 55°F, 7/12/57. Drilled well on property.
Sv 377	15T, 4.9N, 0.5W	B. Lander	--	770	Drl	104	6	--	Du	--	--	Com	Supplies store and restaurant.
Sv 378	15T, 7.2N, 6.5E	C. Kewley	1952	1,260	Drl	151	6	--	Du	22	26	Dom	Dug well 10.5 ft deep nearby; water level 8.8 ft below land surface; reportedly dry some summers.
Sv 380	15T, 5.9N, 6.5E	A. Fascolo	1921	1,190	Drl	141	6	--	Du	20	16	Dom	
Sv 381	15T, 4.9N, 6.7E	R. Rundles	1920	1,115	Dug	13	48	--	Psg	9.9 7/15/57	--	Dom	Temperature 53°F, 7/15/57.
Sv 382	15T, 4.5N, 6.6E	E. LaBarre	1920's	1,170	Dug	19	48	--	Pt	17.0 7/15/57	--	Dom	Reportedly goes dry some summers.
Sv 383	15T, 1.9N, 5.0E	G. White	1949(?)	1,230	Drl	144	6	--	Du	100	5	Dom	
Sv 384	15T, 2.8N, 3.7E	H. Miller	1927	1,060	Drl	129	6	10	Du	12	--	Dom	
Sv 385	15T, 2.4N, 4.4E	Tether Estate	--	1,155	Drl	100	6	0	Du	20	--	Res	Supplies hotel and three cottages.
Sv 386	15T, 2.8N, 5.3E	J. Meyer	--	1,160	Dug	12	36	--	Pt	8	--	Dom	
Sv 387	14U, 8.4S, 5.0E	A. Conklin	--	1,375	Drl	187	6	10	Du	90	10	Dom, Stock	Supplies 2 houses and 20 cows.
Sv 388	15U, 7.5N, 1.9E	H. Meyer	1951(?)	1,465	Drl	87	6	--	Du	25	13	Dom	
Sv 389	15U, 8.4N, 2.5E	G. Anderson	1957	1,540	Drl	107	6	--	Du	52.1 7/16/57	10	None	Well not yet in use at time of survey.
Sv 390	15U, 8.5N, 3.7E	W. Liessner	1936	1,525	Drl	176	6	--	Du	30	35	Dom	
Sv 391	14U, 6.3S, 2.5E	W. Gerstein	1947	1,620	Drl	400	6	--	Du	160	20	Dom	Supplies two houses.
Sv 393	14U, 6.1S, 0.3E	H. Ergenzinger	1942	1,210	Drl	140	6	70	Du	5	--	Dom	Dug well nearby, 16 ft deep; water level 10.8 ft below land surface, 7/16/57; temperature 50°F, 7/16/57. Drilled well flows much of the year.
Sv 394	14U, 7.4S, 0.8E	Three "A" Farm	1935	1,400	Drl	145	6	0	Du	25	35	Dom	Supplies two houses.
Sv 395	15U, 7.8N, 0.2E	M. Spinelli	1926	1,360	Drl	137	6	--	Du	30	15	Dom, Stock	Supplies 600 chickens.
Sv 396	15U, 6.2N, 1.1E	H. A. Starr, Sr.	--	1,255	Dug	12	24	--	Psg	9	--	Dom	
Sv 397	14U, 8.2S, 1.2E	F. Mapes	--	1,440	Dug	25	36	--	Pt	19	--	Dom	Reportedly goes dry occasionally.
Sv 398	14U, 7.9S, 2.3E	S. Baker	1948	1,510	Drl	143	6	--	Du	60	9	Dom, Com	Supplies house and motor vehicle service station.
Sv 399	14U, 2.8S, 0.3E	C. Hinkley, Sr.	1947	1,180	Drl	30	6	--	Pt(?)	12.3 7/16/57	--	Dom	Water reportedly blackish in color and with oily smell. Upper Devonian undifferentiated rocks crop out 20 ft from well.
Sv 403	14U, 7.9N, 1.9W	Village of Liberty	1956	1,560	Drl	97	6	95	Psg	8.2 7/17/57	--	TW	
Sv 411	14U, 7.8N, 1.8W	do.	1956	1,565	Drl	30	12	--	Psg	--	40	TW	(a) (b). Screen setting 20 to 30 ft. Well pumped 72 hours at 40 gpm; following drawdowns produced in observation wells to west: 2.2 ft at distance of 50 ft, 1.5 ft at distance of 102 ft, 1.05 ft at distance of 152 ft.
Sv 414	14U, 3.5N, 0.8E	do.	1956	1,390	Drl	53	6	53	Psg	5	--	TW	

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 415	14U, 3.3N, 0.3E	Village of Liberty	1956	1,390	Drl	49	6	--	Psg	3	200	TW	Temperature 49°F reported 1/14/57. Screened between 43.5 ft and 49 ft. Drawdown of 4.21 ft after 7½ hours at 200 gpm; drawdown of 0.6 ft produced in observation well approximately 1,000 ft to north.
Sv 416	14U, 5.2N, 4.1W	L. Grosswirth	1956	1,660	Drl	209	6	41	Du	60	8	Dom	
Sv 417	14U, 5.7N, 3.7W	E. Bailey	1954	1,860	Drl	200	6	--	Du	67	8	Dom	
Sv 418	14T, 0.7N, 2.9W	Dairymen's League Cooperative Assn., Inc.	1941	785	Drl	317	6	65	Du	50	--	Dom	Water contains hydrogen sulfide. Supplies three houses.
Sv 419	14U, 4.8N, 1.7E	J. & F. Symanski	1956	1,520	Drl	240	6	35	Du	160	--	Dom	Supplies two houses.
Sv 420	14U, 3.4N, 1.4E	M. Ackerman	1955	1,560	Drl	509	6	--	Du	--	--	Dom	Supplies three houses.
Sv 421	14V, 3.0N, 5.9W	F. Borello	--	1,250	Drl	200	8	8	Du	32	8	Dom	Supplies 21 housing units.
Sv 423	15V, 2.7N, 1.3W	H. Stadtmiller	1952	525	Drl	101	6	--	Psg	20	5	Com	Supplies restaurant.
Sv 425	15U, 0.1N, 5.2E	Christiansen	1955	900	Drl	58	6	10	Du	10	See remarks	Dom	Reportedly yields 10-15 gpm in winter, 3-5 gpm in summer. Dug well 12 ft deep nearby; reportedly goes dry in summer and fall.
Sv 427	15U, 5.2N, 4.2E	F. Wayman	--	1,380	Drv	13	1.5	--	Psg	7	--	Dom	
Sv 428	15U, 2.7N, 2.8E	McCormack	1941	1,390	Drl	170	6	--	Du	--	15	Dom	Abandoned dug well 30 ft deep nearby; water level 15.4 ft below land surface, 9/5/57; well is in gravel.
Sv 430	15U, 2.6N, 2.3E	--	--	1,450	Dug	14	36	--	Pt	10.3 9/ 5/57	--	None	Temperature 57°F, 9/5/57.
Sv 431	15U, 2.8N, 1.6E	--	--	1,500	Dug	15	36	--	Pt	7.2 9/ 5/57	--	None	Temperature 60°F, 9/5/57.
Sv 432	15U, 1.0N, 2.5E	M. Dimock	--	1,408	Dug	23	36	--	Pt	16.6 9/ 5/57	--	Dom	Temperature 52°F, 9/5/57.
Sv 433	15U, 7.3N, 3.7E	--	--	1,490	Dug	35	36	--	Pt	30.3 9/ 5/57	--	None	Do.
Sv 434	15U, 5.2N, 3.7E	--	--	1,380	Dug	6	36	--	Psg	2	2	Dom	Supplies two houses.
Sv 435	15U, 6.1N, 3.2E	Cayuga Rod and Gun Club	--	1,504	Dug	22	--	--	Pt	8.9 9/ 9/57	--	Dom	Temperature 56°F, 9/9/57.
Sv 436	15V, 1.4N, 5.0W	G. Schmidt	--	1,090	Dug	30	36	--	Pt	flows	--	Dom	Water used only for laundry purposes.
Sv 437	15U, 0.6N, 2.3E	--	--	1,408	Dug	11	36	--	Pt	9.2 9/ 9/57	--	None	
Sv 439	15U, 8.5N, 5.7E	--	--	1,350	Drl	97	6	--	Du	4.4 9/ 9/57	--	None	Temperature 50°F, 9/9/57. Abandoned dug well 12 ft deep nearby; dry 9/9/57.
Sv 440	15U, 7.6N, 6.0E	A. Brasington	1953	1,295	Drl	400	6	--	Du	--	2	Dom	
Sv 441	14U, 8.1S, 6.0E	--	--	1,380	Dug	8	36	--	Pt	Dry 9/ 9/57	--	Dom	
Sv 442	15V, 2.5N, 5.5W	G. Morlang	1955	1,225	Drl	133	6	10	Du	35	4	Dom	Abandoned dug well 22 ft deep nearby; water level 15.9 ft below land surface, 9/10/57.
Sv 444	15V, 1.5N, 3.9W	--	--	1,090	Dug	17	36	--	Pt	11.9 9/10/57	--	None	
Sv 445	15V, 2.8N, 4.0W	V. C. Page	1939	1,000	Dug	10	60	--	Pt	Dry 9/10/57	--	Dom	Reported dry for first time.
Sv 446	15V, 4.1N, 3.3W	Benton Agency	--	1,200	Dug	19	36	--	Psg	7.0 9/10/57	--	Dom	House unoccupied at time of survey.

Table 7.--Records of selected wells in Sullivan County (Continued)

Well number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 447	15V, 3.5N, 4.2W	--	--	1,150	Dug	15	36	--	Pt	10.8 9/10/57	--	None	
Sv 448	15V, 3.8N, 4.0W	Casio	1949	1,300	Dug	12	48	--	Psg	11.0 9/10/57	--	Dom	
Sv 449	15V, 8.3N, 6.2W	B. McGill	1947	1,390	Drl	240	6	--	Du	--	35	Dom	Unused dug well 19.5 ft deep nearby; water level 18.6 ft below land surface, 9/11/57.
Sv 451	15V, 6.6N, 6.4W	P. Grant	1953	1,268	Drl	70	6	--	Du	--	--	Dom	Unused dug well 28 ft deep nearby; water level 19.0 ft below land surface, 9/11/57.
Sv 452	14U, 3.0N, 1.3E	Grossinger's Hotel	--	1,500	Drl	400	10	--	Du	--	--	Res	(a). Temperature 52°F, 7/23/57. Three other drilled bedrock wells nearby.
Sv 453	15V, 6.7N, 5.3W	Wolf Lake Store	1947	1,520	Drl	90	8	37	Du	18	--	Com, Dom	
Sv 454	15U, 4.0N, 3.8W	--	--	1,248	Dug	15	36	--	Pt	10.2 9/11/57	--	None	
Sv 455	15U, 4.4N, 1.0W	--	--	1,250	Dug	19	36	--	Pt	Dry 9/11/57	--	None	
Sv 456	15U, 8.9N, 1.7W	R. Breakey	1955	1,020	Drv	210	6	--	Psg	--	--	Dom	Well originally 80 ft deep. Deepened to present depth to obtain greater yield.
Sv 457	14U, 5.5S, 1.7W	Ramsey	1925	1,110	Drl	72	6	--	Psg	--	--	Dom	
Sv 460	14V, 3.7S, 1.1W	J. Maliga	1957	1,170	Drl	250	6	6	Du	--	16	Dom	Water leaves white scale on pots.
Sv 462	14V, 2.8S, 2.5W	J. Schuerk	1947	1,162	Drl	532	6	0	Du	250	25	Res	Supplies up to 150 guests. Other drilled well 382 ft deep nearby; supplies swimming pool.
Sv 464	14V, 1.7S, 2.2W	Horowitz	1945	1,320	Drl	315	6	--	Du	120	8	Dom, Stock	Supplies 6,000 chickens, 7 cows. Other drilled well 335 ft deep nearby for emergency use, but not yet in use at time of survey.
Sv 466	14V, 2.0S, 3.5W	J. Jaffee	1935	1,280	Drl	285	6	--	Du	--	35	Res	Supplies up to 100 guests.
Sv 467	14V, 4.4N, 2.6W	F. Musso	1956	1,200	Drl	207	6	--	Du	100	25	Dom	Well originally drilled to depth of 105 ft in 1951, deepened to present depth in 1956.
Sv 468	14V, 5.8N, 2.3W	C. Henderson	1955	1,000	Drl	167	6	--	Du	--	5	Dom	
Sv 469	14V, 6.7N, 2.5W	Hasbrook	1954	920	Drl	80	6	12	Du	--	40	Dom	
Sv 471	15V, 8.3N, 2.6E	Adams	1927	540	Drv	20	2	--	Psg	15	--	Dom	
Sv 472	14V, 7.6S, 2.9E	Coons	--	510	Drv	35	1	--	Psg	--	2	Dom	Driven inside dug well 6 ft deep. Dug well dry at time of survey.
Sv 473	14V, 6.3S, 3.9E	J. Blickstein	1945	400	Drl	90	6	--	Psg	40	65	Res	Supplies up to 200 guests.
Sv 474	14V, 6.3S, 3.9E	do.	1950	400	Drl	300	6	110	See remarks	110	11	Res	Auxiliary well to Sv 473. Well penetrates bedrock below Pleistocene sand and gravel. Rock strata may range in age from Early Hamilton to Oriskany.
Sv 475	14V, 7.0S, 2.4E	N. Budd	--	760	Dug	25	36	--	Pt	20	--	Dom	
Sv 476	14V, 6.9S, 1.6E	M. C. Budd	--	1,220	Dug	16	36	--	Pt	Dry 11/ 7/57	--	Dom	
Sv 477	14V, 7.6S, 0.7E	Bessell	--	1,405	Dug	27	36	--	Pt	26.2 11/ 7/57	--	Dom	
Sv 478	15V, 4.0N, 3.7E	G. Hamilton	1951	520	Drl	155	6	--	HR	--	--	Dom	
Sv 479	15V, 6.2N, 6.1E	Thompson	1956	385	Drv	25	2	--	Psg	--	--	Dom	Well driven inside existing dug well.

Table 7.--Record of selected wells in Sullivan County (Continued)

Number	Location	Owner or occupant	Date completed	Altitude above sea level (feet)	Type of well	Depth (feet)	Diameter (inches)	Depth to bedrock (feet)	Water-bearing unit	Water level below land surface (feet)	Yield (gallons per minute)	Use	Remarks
Sv 480	14V, 6. N, 4.0[illegible]	J. Roth	1953	880	Drl	100	6	0	HR	--	--	Dom	
Sv 481	15V, 1.2N, 1.3E	H. Avery	1956	620	Drl	48	6	43	HR	--	--	Dom	
Sv 482	15V, 3.3N, 3.1E	A. Meier	1949	485	Drl	175	6	30	HR	--	--	Dom	Water contains hydrogen sulfide. Supplies two families.
Sv 483	15V, 3.2N, 3.0E	do.	1952	465	Drl	552	6	--	HR	20	40	Stock	
Sv 484	14V, 6.5S, 4.5W	Calkins	1953	1,380	Drl	140	6	40	Du	--	13	Dom	
Sv 485	14V, 3.5S, 3.3W	H. Cauthers	1950	1,260	Drl	129	6	9	Du	40	--	Dom	Water level reported 31 ft below land surface when well was drilled. Yield inadequate.
Sv 486	14V, 4.5S, 2.4W	Roulnick	1949	1,200	Drl	160	6	13	Du	--	20	Res	Another drilled well 163 ft deep nearby. Both wells supply 20-unit bungalow colony.
Sv 488	14V, 5.7S, 1.0W	Grossbardt	1953	1,220	Drl	261	6	--	Du	100	20	Dom	Supplies two houses.
Sv 489	14V, 7.0N, 6.0W	Nash	1951	1,570	Drl	134	6	--	Du	60	12	Dom	
Sv 491	15V, 4.9N, 2.3E	Shawanga Lodge	prior to 1921	1,150	Drl	200	6	6	HR	--	10	Res	Two other drilled wells 225 ft deep nearby. The three wells have combined yield of 50 gpm.
Sv 494	14V, 4.4S, 3.2W	Atwell	1946	1,320	Drl	250	6	--	Du	110	15	Dom	Two dug wells 30 ft deep nearby are reported to be nearly dry in dry seasons.
Sv 495	13U, 0.5N, 1.8W	E. Shaver	--	1,610	Dug	9	36	--	Psg	7.2 10/ 9/57	--	None	
Sv 497	14T, 0.8N, 3.0W	Callicoon Water Co.	1957	770	Dug	16	72	--	Psg	5	300	PS	Screened from 14 3/4 to 16 ft. Drawdown 5.5 ft when pumped at 343 gpm after 8 hours. Water level reportedly stabilized after pumping for 4 hours.
Sv 498	15V, 3.7N, 3.5E	Cairn's Service Station	1912	440	Drl	187	4	--	HR	flows	--	Com	Not flowing in summer of 1957. Strong hydrogen sulfide odor and taste. Well supplies novelty drinking fountain in motor vehicle service station.
Sv 499	15V, 4.6N, 3.2E	J. Cook	1956	630	Drl	150	6	78	HR	--	--	Dom, Stock	
Sv 500	15V, 5.2N, 4.2E	F. McKeon	1952	490	Drl	110	6	--	HR	21	--	Dom	
Sv 501	15V, 5.4N, 4.3E	Camp Na-Sho-Pa	1957	500	Drl	40	6	--	Psg	3	--	Res	Children's summer camp.
Sv 502	15V, 6.8N, 4.9E	A. J. MacArthur	1958	570	Drl	78	6	--	Psg	10	--	Dom	
Sv 503	15V, 0.6N, 0.5E	J. J. Kane	1949	785	Drl	137	4	--	HR	30	--	Dom	Water contains hydrogen sulfide.
Sv 504	15V, 4.2N, 2.6E	Red Top (Resort)	1956	640	Drl	167	8	29	HR	20	--	Res	Supplies house and four cottages. Water has very slight astringent taste. Another drilled well 185 ft deep nearby. Total yield of both wells inadequate.
Sv 506	13U, 2.5S, 0.5W	Boy Scouts of America, Nassau County Council	1956	2,060	Drl	264	6	63	Du	90	14	Res	Drawdown 35 ft after 6 hours when pumped at 14 gpm.
Sv 507	13U, 2.9S, 0.4W	do.	1957	2,080	Drl	205	6	42	Du	20	60	Res	Drawdown 18 ft after 24 hours when pumped at 60 gpm.
Sv 509	14U, 3.1N, 1.6E	Grossinger's Hotel	1957	1,440	Dug	17	72	--	Psg	4	250	Res	(b). Drawdown 6 ft after 9 hours when pumped at 250 gpm. Screened from 14 to 16 ft. Similar dug well nearby.

Table 8.--Drillers' logs of selected wells in Sullivan County

Location coordinates are explained in the section entitled "Well-Location System."

Geologic correlations and footnotes are by the author.

Logs of wells Sv 111-115, 119, 120, 122-125, and 137 have been edited and condensed by the author. The formation descriptions in the other logs are as supplied by the drillers.

Drillers' notes of hardpan, boulders, and rocks in parts of logs listed under "Pleistocene stratified drift" may indicate presence of lenses of till in these deposits.

	Thickness (feet)	Depth (feet)
Sv 7: 15V, 7.0N, 1.1W; drilled by Greening Bros., 1947; altitude 1,470 feet.		
Upper Devonian rocks, undifferentiated		
Rock, hard, gray	65	65
Rock, red (little water)	35	100
Rock, hard, gray	60	160
Rock, red (water)	75	235
Rock, blue (water)	50	285
Rock, red (water)	27	312
Rock, soft, blue (water)	38	350
Sv 25: 14U, 0.6N, 3.1W; drilled by Layne-New York Co., Inc., 1956; altitude 1,340 feet.		
Pleistocene stratified drift		
Clay, sandy; gravel and boulders	8	8
Sand, dirty; gravel; small boulders	18	26
Sand, coarse, dirty; small amounts of gravel and boulders	17	43
Upper Devonian rocks, undifferentiated		43
Sv 26: 14U, 3.2N, 1.7W; drilled by Wm. Stotthoff Co., Inc., date unknown; altitude 1,700 feet.		
Pleistocene till		
Clay, red	25	25
Upper Devonian rocks, undifferentiated		
Rock, brown	4	29
Rock, red	46	75
Rock, gray	10	85
Rock, red	4	89
Rock, gray	18	107
Rock, red	57	164
Rock, gray	101	265
Rock, red	29	294
Rock, dark	14	308
Rock, gray	30	338
Rock, red	36	374
Rock, gray	90	464
Rock, red	5	469
Sv 42: 14U, 6.3S, 2.6W; driller unknown, date drilled unknown; altitude 1,120 feet.		
Recent		
Topsoil	1	1
Pleistocene stratified drift		
Sand, fine to medium; some clay (some water)	13	14
Clay	18	32
Sand, fine to coarse; gravel; small amount of clay	15	47
Sand, fine to coarse; gravel; clay at 57 ft.	10	57
Sv 57: 15T, 7.2N, 3.6W; drilled by C. W. Lauman & Co., Inc., 1947; altitude 690 feet.		
Pleistocene stratified drift		
Clay, sandy	8	8
Clay and coarse gravel	22	30
Sand, medium to coarse; gravel	27	57
Sv 58: 15T, 7.5N, 3.7W; drilled by Layne-New York Co., Inc., 1956; altitude 690 feet.		
Recent		
Topsoil	2	2
Pleistocene stratified drift		
Sand, fine, brown	5	7
Clay, sandy	4	11
Hardpan, brown	6	17
Gravel and boulders; some clay	4	21
Clay, sandy	2	23
Hardpan	6	29
Sand, coarse; gravel; soma clay	12	41
Clay, soft	37	78
Sand, fine	16	94
Quicksand	8	102
Upper Devonian rocks, undifferentiated		
Sandstone, blue	3	105
Sv 59: 14U, 2.3S, 6.2E; drilled by Layne-New York Co., Inc., 1940; altitude 1,220 feet.		
Recent		
Topsoil	2	2
Pleistocene stratified drift		
Hardpan and boulders	8	10
Sand, coarse; gravel	7	17
Hardpan; boulders; gravel	34	51
Sand, hard-packed	9	60
Hardpan and boulders	10	70
Clay, red, tough	4	74
Sand, coarse; gravel	9	83
Clay, red, soft; muddy sand	11	94
Hardpan and boulders	3	97
Clay, sandy, red	2	99
Gravel, fine; boulders	6	105
Clay; boulders	2	107
Sand, fine, gray	2	109
Sand; boulders	3	112
Clay	2	114
Sand; boulders	6	120
Sand, fine; boulders	25	145
Boulders	3	148
Sv 60: 14U, 2.6S, 6.2E; drilled by Layne-New York Co., Inc., 1940; altitude 1,221 feet.		
Recent		
Topsoil	1	1
Pleistocene stratified drift		
Boulders; gravel; hardpan	4	5
Clay, sandy; gravel	3	8
Sand, coarse; gravel	7	15
Quicksand	8	23
Sand and gravel, cemented	9	32
Sand, fine-packed; streaks of coarse sand; gravel	16	48
Hardpan; boulders; gravel	38	86
Sand, medium; fine gravel	6	92
Clay, red, tough	3	95
Hardpan, streaks of medium-packed sand	8	123
Clay, red, tough	2	125
Sand, red	10	135
Hardpan	2	137
Sand rock (compacted sand?)	3	140
Sand, coarse, packed	6	146
Upper Devonian rocks, undifferentiated		
Rock, red	11	157

Table 8.--Drillers' logs of selected wells in Sullivan County (Continued)

	Thickness (feet)	Depth (feet)
Sv 61: 14V, 2.3S, 6.0W; drilled by Layne-New York Co., Inc., 1945; altitude 1,140 feet.		
Pleistocene stratified drift		
Clay	3	3
Boulders; sand; gravel	11	14
Clay; gravel; sand; boulders	13	27
Clay; sand streaks	13	40
Gravel; coarse sand; clay	16	56
Gravel, hard-packed; sand; clay	19	75
Gravel; sand; clay (water)	10	85
Clay; gravel	10	95
Gravel; sand; clay (water)	11	106
Clay; gravel; sand; hardpan	23	129
Clay	13	142
Gravel; sand; clay	31	173
Gravel; sand; clay	8	181
Clay and gravel	6	187
Upper Devonian rocks, undifferentiated		
Rock	4	191
Sv 62: 14V, 1.0S, 5.5W; drilled by Layne-New York Co., Inc., 1948; altitude 1,175 feet.		
Pleistocene stratified drift		
Sand	4	4
Boulders; gravel	16	20
Clay; gravel	7	27
Gravel; sand; clay	14	41
Sand; clay; gravel	9	50
Sand, gray; clay streaks	10	60
Gravel; sand; clay streaks	14	74
Sand; gravel	12	86
Clay	4	90
Gravel, coarse; sand	4	94
Sand	8	102
Clay	6	108
Sand; clay streaks	11	119
Sand, gray; clay streaks	8	127
Sand, dirty	4	131
Sand; gravel	7	138
Clay; sand	3	141
Sand; gravel; clay streaks	6	147
Clay, sandy, soft	6	153
Sand	6	159
Clay	1	160
Gravel, coarse; sand	6	166
Upper Devonian rocks, undifferentiated		166
Sv 63: 14V, 0.7S, 5.4W; drilled by Layne-New York Co., Inc., 1949; altitude 1,180 feet.		
Pleistocene stratified drift		
Clay, sandy	7	7
Sand; gravel; boulders	6	13
Clay, sandy; gravel	10	23
Sand, muddy	7	30
Sand; gravel; boulders	3	33
Clay, tan	3	36
Clay, packed; gravel	12	48
Clay, hard-packed	4	52
Sand, cemented; clay; gravel	4	56
Clay; boulders; gravel	5	61
Sand, coarse, gray; gravel	2	63
Clay, hard-packed, red; gravel	19	82
Clay, red; gravel; boulders	43	125
Gravel, sandy	12	137
Sand, dirty	17	154

	Thickness (feet)	Depth (feet)
Sv 64: 14V, 0.7S, 5.3W; drilled by Layne-New York Co., Inc., 1954; altitude 1,180 feet.		
Recent		
Topsoil	6	6
Pleistocene stratified drift		
Gravel; clay	11	17
Gravel	14	31
Clay; sand; gravel	14	45
Boulders; clay	5	50
Clay; sand; gravel	3	53
Clay; gravel	46	99
Sand, coarse; gravel	2	101
Clay; gravel	4	105
Gravel; clay; rock	11	116
Sand; gravel	13	129
Clay, sandy; gravel streaks	21	150
Upper Devonian rocks, undifferentiated		
Rock	2	152
Sv 89: 14V, 2.4N, 5.5W; drilled by Layne-New York Co., Inc., 1956; altitude 1,220 feet.		
Pleistocene stratified drift		
Sand; gravel; boulders	6	6
Clay, red	6	12
Shale 1/; boulders	23	35
Shale, hard; sand streaks	15	50
Shale, hard	5	55
Shale; sand streaks	27	82
Shale, hard	21	103
Shale, hard; clay streaks	23	126
Shale; sandy gravel	15	141
Shale, hard	4	145
1/ This well is not believed to penetrate bedrock. The word "shale" as used in this log probably refers to hard-packed clay.		
Sv 100: 15V, 0.1N, 3.0W; drilled by Allen J. Greening, 1956; altitude 515 feet.		
Pleistocene stratified drift		
Hardpan and boulders	60	60
Gravel; sand	19	79
Gravel; fine sand, red	6	85
Quicksand, fine, gray	33	118
Gravel, fine, brown, sandy	1	119
Clay, red	16	135
Middle Devonian Hamilton (?) group		
Shale, black 1/	50	185
Shale, yellow (water)	5	190
Shale, black (water)	5	195
1/ The "black" shale described would be typical of basal rocks of the Hamilton group.		
Sv 107: 14U, 2.9N, 3.9W; drilled by Layne-New York Co., Inc., 1955; altitude 1,330 feet.		
Recent		
Topsoil	3	3
Pleistocene stratified drift		
Clay, gray	5	8
Clay, sandy	7	15
Gravel, fine	5	20
Clay, red	29	49
Gravel, coarse	11	60
Upper Devonian rocks, undifferentiated		60

Table 8.--Drillers' logs of selected wells in Sullivan County (Continued)

	Thickness (feet)	Depth (feet)
Sv 111: 13U, 5.2S, 4.4E; drilled by Sprague and Henwood, Inc., 1944; altitude 1,817 feet.		
Recent		
Topsoil	1	1
Pleistocene stratified drift		
Sand, fine, 60 percent; stones, 30 percent; clay, 10 percent	21	22
Sand, 60 percent; gravel, 20 percent; stones, 10 percent; clay, 10 percent	23	45
Sand, 60 percent; gravel, 30 percent; clay, 10 percent; boulders at 65 ft and 70 ft	25	70
Sand, 70 percent; gravel, 20 percent; silt, 10 percent	25	95
Sand, 60 percent; clay, 20 percent; gravel, 10 percent; silt, 10 percent; inflow of water 5 gpm	19	114
Sand, 60 percent; gravel, 20 percent; silt, 10 percent; clay, 10 percent; inflow of water 7 gpm.	46	160
Sand, 50 percent; gravel, 20 percent; clay, 20 percent; silt, 10 percent	5	165
Sand, 60 percent; clay, 20 percent; gravel, 10 percent; silt, 10 percent	4	169
Sand, 70 percent; clay, 20 percent; silt, 10 percent	11	180
Sand, 70 percent; gravel, 10 percent; silt, 10 percent; clay, 10 percent; boulders at 217 ft	37	217
Sand, 70 percent; gravel, 10 percent; silt, 10 percent; clay, 10 percent; inflow of water 0.5 gpm	10	227
Upper Devonian rocks, undifferentiated		
Shale, red	18	245
Sandstone, gray	4	249
Sv 112: 13U, 5.3S, 4.5E; drilled by Sprague and Henwood, Inc., 1944; altitude 1,812 feet.		
Pleistocene stratified drift		
Sand, fine	4	4
Sand; gravel, coarse	6	10
Sand; gravel; boulders, coarse	10	20
Gravel, fine; small stones; sand; boulders at 22 ft	28	48
Gravel; small stones; sand; inflow of water at 60 ft, 2 gpm	32	80
Gravel; stone, 40 percent; sand, coarse, 30 percent; sand, fine, 30 percent; inflow of water at 90 ft, 12 gpm; inflow of water at 94 ft, 16 gpm	14	94
Gravel, stone, 40 percent; sand, coarse, 30 percent; sand, fine, 30 percent; inflow of water at 106 ft, 16 gpm	12	106
Sand, coarse and fine; lost water at 107 ft	34	140
Sand, fine, 80 percent; sand, coarse, 10 percent; silt, 10 percent; artesian flow at 155 ft, 6 gpm; lost water at 157 ft, inflow of water at 160 ft, 14 gpm	22	162
Sand, 90 percent; silt, 10 percent; artesian flow at 190 ft, 16 gpm; artesian flow stopped at 200 ft; inflow of water at 205 ft, 1 gpm; inflow of water at 220 ft, 2 gpm.	66	228
Sand, fine, 70 percent; sand, coarse, 20 percent; silt, 10 percent	5	233
Pleistocene stratified drift (cont.)		
Sand, fine, 50 percent; gravel, 30 percent; sand, coarse, 20 percent; compacted into hard beds	5	238
Sand, fine, 70 percent; gravel, 20 percent; small stones, 10 percent; inflow of water at 240 ft; inflow stopped at 242 ft	8	246
Sand, fine, 90 percent; silt, 10 percent; inflow of water at 249 ft, 3 gpm	3	249
Upper Devonian rocks, undifferentiated		
Sandstone, gray; inflow of water at 270 ft, 1 gpm	21	270
Sv 113: 13U, 5.4S, 4.6E; drilled by Sprague and Henwood, Inc., 1937; altitude 1,837 feet.		
Pleistocene stratified drift		
Boulders; sand; clay; hard-packed; very little clay or rock flour; intermittent loss of water to 9.5 ft	11	11
Sand, fine, hard-packed	3	14
Sand, medium to coarse, 70 percent; stones, small, 19 percent; rock flour, 10 percent; clay, 1 percent; dry sample at 15.5 ft	2	16
Boulders	10	26
Sand, medium to coarse	2	28
Sand, fine, compact	3	31
Sand, fine, loose	9	40
Sand, coarse; clay	5	45
Sand and clay	3	48
Stones, small; sand; little clay; hard-packed	11	59
Stones, small; sand, hard-packed; clay; rock flour	20	79
Boulders; sand; clay	20	99
Sand, fine; rock flour	15	114
Boulders, small; sand; clay	2	116
Stones, small; sand; clay	2	118
Sand, hard, compact; clay; red shale (fragments?)	4	122
Sand; clay; rock flour	3	125
Sand; clay or rock flour	8	133
Sand; red shale (fragments?)	7	140
Sand, fine; red shale (fragments?)	3	143
Sand; soft red shale (fragments?)	3	146
Upper Devonian rocks, undifferentiated		
Sandstone, medium-grained, reddish	8	154
Sandstone, medium and coarse-grained, red and gray	3	157
Shale, red and gray	1	158
Sandstone, coarse-grained, gray, with thin bed of gray shale	8	166
Sv 114: 13V, 7.4S, 4.9W; drilled by Sprague and Henwood, Inc., 1944; altitude 1,612 feet.		
Pleistocene unstratified drift (till)		
Clay, red, 50 percent; broken stones, 30 percent; sand, 20 percent	5	5
Shale, weathered, red; red clay	8	13
Upper Devonian rocks, undifferentiated		
Shale, red	5	18
Shale, red; grades downward into red sandstone	1	19
Sandstone, fine-grained, red	1	20
Sandstone, predominantly medium-grained, gray; few thin shale beds near middle	25	45
Sandstone, conglomeratic, gray	5	50
Sandstone, predominantly medium-grained, gray; scattered thin shale beds in lower half	20	70

Table 8.--Drillers' logs of selected wells in Sullivan County (Continued)

	Thickness (feet)	Depth (feet)
Upper Devonian rocks, undifferentiated (cont.)		
Shale, gray and red	3	73
Sandstone, medium-grained, gray	8	81
Sandstone, medium-grained, gray; scattered thin beds of gray shale.	10	91
Sandstone, medium-grained, conglomeratic, gray	9	100
Sandstone, predominantly medium-grained; scattered thin beds of gray shale	21	121
Sandstone, medium-grained, gray	9	130
Sandstone, medium-grained, gray; scattered thin beds of gray shale.	4	134
Shale, sandy, mottled red and gray..	3	137
Sandstone, predominantly medium-grained, gray; scattered thin beds of shale	28	165
Shale, sandy, gray	5	170
Sandstone, predominantly medium-grained; scattered thin beds of gray shale	27	197
Shale, red	15	212
Shale, red, sandy near top	4	216
Sandstone, shaly, red	2	218
Sandstone, predominantly medium-grained, gray; scattered thin beds of gray shale; trace of coal at 237 ft; 1 ft of gray shale at bottom	31	249
Shale, red, grading to sandy in lower half	9	258
Shale, red; scattered thin beds of red sandstone	10	268
Shale, red; 0.5 ft of mottled red and green shale at 281 ft	34	302
Sandstone, reddish-gray	2	304
Shale, sandy, gray	5	309
Sandstone, medium-grained, gray; thin bed of gray shale at bottom..	10	319
Shale, red	2	321
Sandstone, red, slightly shaly	10	331
Shale, sandy, red; grades into medium-grained gray sandstone in bottom foot	13	344
Sandstone, medium-grained, gray	19	363
Sandstone, predominantly conglomeratic, gray and greenish-gray; scattered thin gray shale beds; 3 ft of sandy gray shale with many irregular white laminae from 395 to 398 ft	46	409
Sandstone, predominantly medium-grained; scattered thin gray shale beds; 1 ft gray sandy shale near top	22	431
Sandstone, shaly, gray and red	3	434
Sandstone, predominantly medium-grained; scattered thin beds of gray shale and gray sandy shale; numerous thin shale beds in lower 10 ft	125	559
Sandstone, predominantly medium-grained; ¼-inch band of coal, quartz and pyrite at 563 ft; numerous laminae of coal and pyrite in lower half	10	569
Sandstone, predominantly medium-grained, gray	15	584
Shale, gray; grades downward into sandy red shale	2	586
Shale, sandy, red; grades into medium-grained gray sandstone in lower 3 ft	8	594
Sandstone, medium-grained, gray	22	616
Sandstone, predominantly medium-grained; scattered thin shale beds in upper half	13	629
Upper Devonian rocks, undifferentiated (cont.)		
Sandstone, predominantly medium-grained; scattered thin beds of gray shale; 2 ft of shaly gray sandstone near bottom	38	667
Shale, sandy, red	28	695
Sandstone, fine-grained, reddish-gray; grades into fine-grained gray sandstone in lower 2 ft	6	701
Sandstone, fine-grained, gray; thin bed of gray shale at bottom	4	705
Sandstone, medium-grained, gray; many thin shale beds in lower 3 ft	19	724
Sandstone, fine-grained, gray	5	729
Sandstone, medium and fine-grained, gray; 0.4 ft vein of calcite at bottom	3	732
Sandstone, medium-grained, gray; scattered thin shale beds	6	738
Shale, red and green; grades downward into sandy gray shale	2	740
Shale, sandy, gray	3	743
Loss of water from 304 ft to bottom of hole.		
Sv 115: 13V, 8.1S, 5.0W; drilled by Sprague and Henwood, Inc., 1954; altitude 1,527 feet.		
Pleistocene stratified drift		
Sand, coarse to fine, reddish-brown; rock chips; moist, loose, permeable	10	10
Gravel; rock chips; coarse to fine sand; red, damp, firm, impermeable	5	15
Gravel; coarse to fine sand; trace of silt; red, damp, firm, slightly permeable	5	20
Boulders	1	21
Upper Devonian rocks, undifferentiated		
Sandstone, predominantly medium-grained, gray; lost water from 46 to 62 ft	67	88
Shale, red	15	103
Shale, gray	9	112
Sandstone, fine-grained, gray; scattered thin beds of shale	20	132
Shale, red; 1 ft fine red sandstone near top; interbedded gray shale in lower 3 ft	42	174
Sandstone, predominantly medium-grained, gray	7	181
Shale, gray	2	183
Shale, red	11	194
Sandstone, predominantly fine-grained, red	14	208
Sandstone, medium-grained, gray; 0.5 ft gray shale at bottom	11	219
Shale, red	3	222
Sandstone, fine-grained, red	6	228
Sandstone, fine-grained, gray	3	231
Shale, sandy, gray	7	238
Shale, gray, speckled with red	5	243
Shale, gray	4	247
Sandstone, predominantly fine-grained, gray	9	256
Sandstone, predominantly fine to medium-grained; 0.8 ft gray shale near bottom	9	265
Shale, gray	7	272
Sandstone, predominantly medium-grained, gray	14	286
Sandstone, predominantly coarse-grained, gray; started losing water at 306 ft	30	316
Sandstone, predominantly fine-grained, gray	15	331

Table 8.--Drillers' logs of selected wells in Sullivan County (Continued)

	Thickness (feet)	Depth (feet)
Upper Devonian rocks, undifferentiated (cont.)		
Sandstone, predominantly medium-grained, gray; thin gray shale beds near middle; shaly in lower 3 ft	15	346
Sandstone, predominantly medium-grained, gray; shaly in lower 3 ft	33	379
Shale, red	1	380
Sandstone; shale; shaly sandstone; gray, interbedded	26	406
Sandstone, predominantly medium-grained, gray	29	435
Shale, gray	5	440
Sandstone and shale, gray, interbedded	16	456
Shale, sandy, red	14	470
Sandstone, predominantly medium-grained, gray	7	477
Shale, sandy, red; few thin shale beds in lower 2 ft	11	488
Sandstone, predominantly medium-grained, gray	32	520
Sandstone, predominantly fine-grained, gray; few thin gray shale beds in top 0.5 ft; stopped losing water at 520 ft	6	526
Sandstone, predominantly medium-grained, gray; thin gray shale bed 4 ft from bottom; 1 ft shaly sandstone at bottom	15	541
Sandstone; predominantly fine-grained, gray; thin gray shale bed 14 ft from bottom; started losing water at 572 ft	35	576
Shale, sandy, gray	9	585
Shale, gray	11	596
Sandstone, fine-grained, gray	1	597
Shale, sandy, gray	3	600
Sandstone, fine-grained, gray	1	601
Sandstone, shaly, gray	3	604
Sandstone, medium-grained, gray; thin gray shale bed 5 ft from bottom	12	616
Sandstone, medium-grained, gray; shaly in upper foot	10	626
Shale, gray	5	631
Sandstone, very fine-grained, red	8	639
Sandstone, fine-grained, gray	4	643
Shale, gray	2	645
Shale, red	8	653
Sandstone, predominantly medium-grained, gray; 2 ft of gray sandy shale 1 ft from top; 0.4 ft of red shaly sandstone 14 ft from bottom.	41	694
Shale, sandy, gray	10	704
Sandstone, fine-grained, gray; water still being lost at bottom of hole	2	706
Sv 119: 13U, 6.0S, 1.4E; drilled by Sprague and Henwood, Inc., 1954; altitude 1,684 feet.		
Pleistocene unstratified drift (till)		
Rock chips; sand; silt; clay; red, compact damp and impermeable	8	8
Upper Devonian rocks, undifferentiated		
Shale, red; some thin, red sandstone beds in lower half	5	13
Shale, gray	5	18
Sandstone, coarse-grained, gray	22	40
Sandstone, predominantly coarse-grained, gray; interbedded thin gray shale	10	50
Sandstone, medium- to coarse-grained, gray	15	65
Sandstone, predominantly medium-grained, gray; 0.5 ft of shale 5 ft from bottom	17	82
Upper Devonian rocks, undifferentiated (cont.)		
Shale, gray; few beds of medium-grained sandstone from thin to 1 ft thick	26	108
Sandstone, predominantly medium-grained, gray; few scattered beds of gray shale	23	131
Shale, red	2	133
Sandstone, medium-grained, gray	2	135
Shale, gray	2	137
Sandstone, predominantly medium-grained, gray	28	165
Sandstone, predominantly medium-grained, gray; few scattered beds of gray shale from thin to 0.8 ft thick	39	204
Shale, red; grades into red sandstone in lower 3 ft	17	221
Sandstone, fine-grained, gray	14	235
Sandstone, gray; red shale lenses	5	240
Sandstone, predominantly fine-grained, gray	15	255
Shale, gray	7	262
Sandstone, predominantly medium-grained, gray; 0.5 ft gray shale 2 ft from bottom; artesian flow of 2 gpm started at 270 ft and continued during drilling	67	329
Shale, red; 4.0 ft of medium-grained reddish sandstone near bottom	34	363
Sandstone, predominantly medium-grained, gray; many thin beds of gray shale	66	429
Shale, red	1	430
Sandstone, medium-grained, gray	2	432
Shale, red	24	456
Sandstone, predominantly medium-grained, gray; scattered gray shale beds from thin to 1 ft thick	18	474
Shale, red	19	493
Sandstone, fine-grained; shale, gray; interbedded	38	531
Shale, red	5	536
Shale, sandy, gray	2	538
Shale, red	3	541
Sandstone, predominantly fine-grained, gray; scattered beds of gray shale from thin to 1 ft thick	23	564
Sandstone, predominantly coarse-grained, gray; few thin gray shale beds 2 ft from top; thin bed of coal approximately 3 ft from bottom	30	594
Sandstone, predominantly medium-grained, gray; scattered thin gray shale beds in lower 15 ft	45	639
Sandstone, predominantly fine-grained, gray; few scattered thin gray shale beds	18	657
Sandstone, medium-grained, gray; thin beds of red shale	3	660
Sandstone, predominantly medium-grained, gray; few scattered gray shale beds	90	750
Sandstone, fine-grained, reddish	6	756
Sandstone, medium-grained, gray; trace of coal (depth not given)	6	762
Sandstone, fine-grained, gray	3	765
Sandstone, predominantly fine-grained; shale, red	28	793
Sandstone, medium- to fine-grained, gray; few scattered thin beds of gray shale	38	831

Table 8.--Drillers' logs of selected wells in Sullivan County (Continued)

	Thickness (feet)	Depth (feet)
Sv 120: 13U, 4.2S, 4.0W; drilled by Sprague and Henwood, Inc., 1954; altitude 1,699 feet.		
Pleistocene unstratified drift (till)		
Rock chips; sand; silt; dark gray, moderately firm, moist, slightly permeable	5	5
Rock chips; coarse to fine sand; brown, medium firm, moist, poorly permeable	5	10
Rock chips; gravel; coarse sand; trace of silt; gray, loose, wet, permeable	5	15
Rock chips; gravel; coarse sand; gray, loose, wet, permeable; trace of red silt.	5	20
Rock chips; gravel; fine sand; silt; red, firm, moist, impermeable	23	43
Upper Devonian rocks, undifferentiated		
Sandstone, predominantly medium-grained, gray; 0.6 ft of gray shale at 78 ft	53	96
Shale, red	5	101
Sandstone, medium- to fine-grained, gray; thin shale bed near bottom	3	104
Shale, red	2	106
Sandstone, coarse, medium and fine-grained, interbedded, gray	58	164
Sandstone, coarse-grained, reddish	2	166
Sandstone, predominantly medium-grained, gray; 2 ft bed of gray shale at 180 ft	38	204
Sandstone, predominantly medium-grained, gray; scattered beds of gray shale from thin to 1 ft thick	110	314
Sandstone, predominantly fine-grained, gray; scattered beds of gray shale from thin to 2 ft thick; few coal laminae at 434 ft.	236	550
Shale, red and gray interbedded	2	552
Shale, sandy, red	4	556
Sandstone, fine-grained, red	4	560
Sandstone, predominantly fine-grained, gray; scattered beds of gray shale from thin to 2 ft thick; coal laminae at 607 ft.	154	714
Sandstone, fine-grained, gray; red and gray shale; interbedded	3	717
Sandstone, fine-grained, gray	32	749
Sandstone, fine-grained, gray; scattered gray shale beds from thin to 0.6 ft thick	11	760
Sandstone, fine-grained, gray; 1 ft of gray shale at 793 ft	48	808
Water added to hole throughout drilling operation.		
Sv 121: 13U, 0.1N, 2.5W; drilled by Sprague and Henwood, Inc., 1944; altitude 1,583 feet.		
Pleistocene stratified drift		
Gravel, 60 percent; sand, 30 percent; clay, 10 percent	10	10
Sand, 90 percent; silt, 10 percent; blasted boulders at 37 and 45 ft.	49	59
Sand, 70 percent; clay, 20 percent; silt, 10 percent; blasted boulders from 96 to 101 ft and from 126 to 128 ft; inflow of water ½ to 1 gpm at 90 ft	78	137
Upper Devonian rocks, undifferentiated		
Shale, red; thin red sandstone bed 5 ft from bottom	20	157
Sv 122: 13U, 0.1S, 2.4W; drilled by Sprague and Henwood, Inc., 1944; altitude 1,590 feet.		
Recent		
Topsoil	1	1
Pleistocene stratified drift		
Sand, 70 percent; gravel, 20 percent; stones, 10 percent	6	7
Sand, fine, 80 percent; clay, 20 percent	62	69
Sand, 60 percent; clay, 30 percent; silt, 10 percent; blasted boulders at bottom	73	142
Sand, 70 percent; clay, 20 percent; silt, 10 percent; blasted boulders at 154 ft	15	157
Sand, 50 percent; gravel, 20 percent; clay, 20 percent; silt, 10 percent	14	171
Sand, 70 percent; clay, 20 percent; silt, 10 percent; boulders at 182 and 188 ft; blasted boulder at 208 ft; inflow of water 2 gpm at 180 ft; inflow of water 7 gpm at 200 ft	48	219
Upper Devonian rocks, undifferentiated		
Shale, gray; inflow of water 8 gpm	2	221
Sandstone, gray	4	225
Sandstone, gray; scattered thin beds of gray shale	10	235
Sandstone, gray	4	239
Sv 123: 13U, 0.2S, 2.3W; drilled by Sullivan Machinery Co., 1937; altitude 1,597 feet.		
Pleistocene stratified drift		
Boulders, small; sand; rock flour; clay	46	46
Boulders, small; rock flour; compact red clay; small amount of sand	35	81
Stones, small; sand	3	84
Boulders, small; compact red clay	16	100
Boulders, small; small stones; sand; small percentage of clay	4	104
Clay, red, compact; small boulders; sand	6	110
Sand, 60 percent; clay, 40 percent	5	115
Boulders, small; rock flour; sand; compact red clay	45	160
Boulders, small; rock flour; sand; clay; artesian flow 15-25 gpm from 161 to 169 ft - decreased to 5 gpm after casing driven below 162 ft; increased to 20-35 gpm from 168 to 175 ft; artesian flow 4 to 10 gpm below 175 ft	24	184
Sand, fine, compact; small percentage of clay	4	188
Upper Devonian rocks, undifferentiated		
Shale, reddish to gray	12	200
Sandstone, predominantly fine-grained, gray; artesian flow 4 to 10 gpm continued from 175 ft	8	208
Hole backfilled with sand. Artesian flow ceased.		

Table 8.--Drillers' logs of selected wells in Sullivan County (Continued)

	Thickness (feet)	Depth (feet)
Sv 124: 13U, 3.6S, 2.4E; drilled by Sullivan Machinery Co., 1937; altitude 2,044 feet.		
Pleistocene (?) stratified deposits		
Sand, predominantly medium to coarse; small stones between 5 and 7 ft	15	15
Sand, predominantly medium to fine; small stones between 16 and 21 ft.	8	23
Upper Devonian rocks, undifferentiated		
Sandstone, coarse-grained, light-gray	6	29
Sandstone, fine-grained, light-gray.	6	35
Sandstone, coarse-grained, black-spotted; thin beds of light shale in bottom 0.5 ft	3	38
Shale, light-gray in upper part to blue in bottom foot	3	41
Sandstone, fine to coarse-grained, gray	2	43
Water added to well during construction from 24 ft to bottom.		
Sv 125: 14U, 5.2N, 5.8E; drilled by Giles Drilling Corp., 1929; altitude 1,275 feet.		
Pleistocene stratified drift		
Sand, medium and coarse, reddish-brown and gray; scattered traces of red clay	10	10
Sand, predominantly fine and medium, reddish-brown and gray; scattered traces of red clay	80	90
Sand, medium and coarse, reddish-brown and gray; small stones; red clay, 25 percent	10	100
Sand, fine and medium, reddish-brown and gray; trace of red clay	10	110
Clay, red, 50 percent; sand, fine and medium, reddish-brown and gray; small stones	10	120
Sand, fine and medium, reddish-brown and gray; small stones; red clay, 20 percent	20	140
Upper Devonian rocks, undifferentiated		
Conglomerate, gray, dirty	21	161
Sv 126: 14U, 3.3N, 4.0W; drilled by Layne-New York Co., Inc., 1949; altitude 1,330 feet.		
Pleistocene stratified drift		
Clay, brown	2	2
Clay, tough, gray	5	7
River mud; fine gravel; wood	5	1/ 12
Clay; fine gravel; boulders	21	33
Sand, slightly muddy; gravel; boulders	8	41
Sand; gravel; boulders	13	54
Broken rock	3	57
1/ Part of the first 12 ft may represent Recent alluvium and swamp deposits.		
Sv 127: 14U, 3.3N, 4.0W; drilled by Layne-New York Co., Inc., 1949; altitude 1,330 feet.		
Recent		
Topsoil	2	2
Pleistocene stratified drift		
Clay and sand	7	9
River mud and sand	2	11
Clay; sand; boulders	9	20
Boulders, large, in sandy clay and gravel	20	40
Gravel, coarse	9	49
Rock, broken	2	51
Sv 128: 14U, 2.6N, 3.6W; drilled by Layne-New York Co., Inc., 1955; altitude 1,340 feet.		
Pleistocene stratified drift		
Sand, coarse	8	8
Sand, coarse, and small gravel	4	12
Gravel and sand	10	22
Sand, fine	20	42
Sand, fine; few pieces of broken stone	11	53
Sand, fine; broken stone (few pieces), river mud	22	55
Sv 129: 14U, 2.7N, 3.7W; drilled by Layne-New York Co., Inc., 1955; altitude 1,330 feet.		
Recent		
Topsoil	2	2
Pleistocene stratified drift		
Sand, coarse, brown	34	36
Sand, fine	8	44
Gravel, coarse; sand	23	67
Upper Devonian rocks, undifferentiated		67
Sv 131: 14U, 2.8N, 3.8W; drilled by Layne-New York Co., Inc., 1955; altitude 1,330 feet.		
Recent		
Topsoil	2	2
Pleistocene stratified drift		
Sand, white	4	6
River mud and clay	37	43
Boulders; gravel; some coarse sand..	15	58
Upper Devonian rocks, undifferentiated		58
Sv 137: 13U, 5.5S, 4.9E; drilled by Sprague and Henwood, Inc., 1944; altitude 1,881 feet.		
Recent		
Topsoil	1	1
Pleistocene stratified drift		
Stones; gravel; clay	6	7
Sand	8	15
Sand and gravel	5	20
Upper Devonian rocks, undifferentiated		
Sandstone, gray	8	28
Shale, red; contained pyrite in lower 10 ft; lost water at 55 ft..	41	69
Sandstone, red	7	76
Sandstone, gray	6	82
Sandstone, red	7	89
Shale, red	10	99
Sandstone, red	10	109
Sandstone, gray	59	168
Shale and sandstone, red	11	179
Sandstone, shaly, red	9	188
Sandstone, red	10	198
Sandstone, gray	187	385
Sandstone, gray, shaly in lower 10 ft	38	423
Sandstone, red, shaly in upper 10 ft	22	445
Sandstone, gray	90	535
Sandstone, red; upper 9 ft shaly	15	550
Sandstone, gray	17	567
Sandstone, red, shaly in lower 10 ft	40	607
Sandstone, shaly, gray	11	618
Sandstone, red; upper 4 ft shaly	14	632
Sandstone, gray	109	741
Sandstone, red; upper 4 ft shaly	10	751
Sandstone, gray	148	899
Sandstone, shaly, red	62	961
Sandstone, gray	5	966

Table 8.--Drillers' logs of selected wells in Sullivan County (Continued)

	Thickness (feet)	Depth (feet)
Sv 411: 14U, 7.8N, 1.8W; drilled by Ranney Method Water Supplies, Inc., 1956; altitude 1,565 feet.		
Pleistocene stratified drift		
Clay, sand, gravel, and boulders....	18	18
Sand, gravel, and boulders.....	12	30
Clay.....	1	31
Sand.....	1	32
Sv 497: 14T, 0.8N, 3.0W; dug by Caisson Wells, Inc., 1957; altitude 770 feet.		
Pleistocene stratified drift		
Sand, brown, silty.....	3	3
Gravel, with sand, brown, silty.....	5	8
Sand and gravel, brown, dirty.....	4	12
Sand, coarse, brown.....	4	16
Sand and gravel, brown.....	4	20
Sand, fine, very silty, brown (non-water bearing).....	6	26
Sv 509: 14U, 3.1N, 1.6E; dug by Caisson Wells, Inc., 1957; altitude 1,440 feet.		
Pleistocene stratified drift		
Clay, sand, and stones.....	6	6
Sand.....	4	10
Sand and gravel, some clay.....	4	14
Sand and gravel.....	3	17
Clay and gravel.....	5	22